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W. E. DAVIS,

Surveyor.

THIRD EDITION.

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PREFACE.

THE Author in producing this book has endeavoured to make it essentially a practical one; the methods set forth being generally those of his own practice, subject to certain modifications found necessary to suit special circumstances. The intention being to make it a reliable handbook for the Student pure and simple, a hard and fast line has been drawn, limiting its scope to the method of procedure in the production of a good Bill of Quantities, leaving out those questions of Law and other matters that do not come within the province of the Student for whom the work is designed.

The examples given, whilst intentionally simple, to avoid confusing the Student by a mass of detail, will be found to cover almost every phase of the subject; and although the study alone of any one book, or any number of books, will not make a properly qualified Surveyor, the Author hopes that this work will be found useful and acceptable to the Student who sets out with the idea of thoroughly mastering his subject, by helping him over those

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difficulties that he is bound to encounter at the outset of his professional career, always bearing in mind that it is only by hard work, and practical experience, that he can hope to attain real proficiency in the science.

The work for the main part was originally written for and appeared in the columns of *The Builder*, but has been revised and amplified where thought desirable.

W. E. DAVIS.

13, John Street, Adelphi, W.C.
September, 1899.

PREFACE TO SECOND THOUSAND.

THE gratifying fact that the first edition of this book (one thousand copies) has been sold within eighteen months, as well as the kind expressions of opinion both from individuals and the Press, seem to justify the author's belief that such a work was needed, *i.e.*, a work which should be of assistance to the Student at the outset of his studies.

So far as the author has been able to gauge the opinions of those competent to judge, the arrangement of the work has met with general approval; it has, therefore, not been considered advisable to do more than make a few unimportant corrections.

The author takes this opportunity of thanking all who have assisted in making known this little work, especially those leaders of classes who have adopted it as a text book.

W. E. DAVIS.

13, John Street, Adelphi, W.C.
April, 1901.

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QUANTITIES AND QUANTITY TAKING.

CHAPTER I.

Introduction.

The object of a Bill of Quantities is essentially to enable builders to arrive at an exact estimate of work to be done, and in the case of a competition to place all the competitors upon the same footing, though upon looking through some of the bills sent to contractors one would think this idea was farthest from the thought of the persons who prepared them. Items lumped together, items most ambiguously worded, and (worst of all) items which give one the impression that the person who prepared these bills was in grave doubt as to what was really meant, and so left it to the contractor to make up his deficiency.

The term "surveyor" is purposely avoided in the foregoing sentence, as bills such as have been described are generally prepared by somebody who has had more in his mind the fees than the idea of preparing bills of quantities with the object first mentioned.

In the next place, architects are frequently under the impression that quantities increase the cost of the work. This is a fallacy long since exploded as regards honest attempts to get a fair price, and as for those members of the profession who endeavour to save their clients' money—more out of consideration for their own credit than for their client's pocket—by holding back information that ought to be placed before the contractors tendering, they are doing their best to make a rod for their own back, as well as for that of their clients. In looking through the law cases it will be found that few of the contracts, where there is any dispute, have been based upon a really *good* bill of quantities.

Even if quantities are not prepared for the employer, it by no means follows that he does not pay for them. Few contractors care to jump at a price, unless they jump high

enough to cover all contingencies; so the drawings are handed to a surveyor by the contractor, instead of by the architect, and he has to prepare his bills in perhaps half or quarter the time that should be allowed; he, therefore, to protect himself, has to "lump" items, and to take his dimensions liberally, and then, for these rough quantities, as it is frequently a case of "no success no pay," heavy fees are tacked on to the estimate, which, of course, have to be paid by somebody, and that somebody is the employer.

Again, no one who has not had experience in settling up the accounts at the completion of the works can appreciate the great assistance derived from a carefully prepared bill of quantities; apart from the fact that one is enabled to make a better settlement, from his client's point of view, at the same time satisfying the contractor that he is being fairly treated.

This being the case, it behoves the young surveyor to set out with the idea of preparing such bills as shall leave the persons tendering in no doubt as to the intention of the architect as shown by his drawings and specification, and it is well that he should bear in mind that this goal is not attained without strict application, and whatever treatises he may read will be of little avail unless he applies himself to his subject with diligence and a determination to thoroughly master all its details; for if there is one subject more than another in which "a little knowledge is a dangerous thing," that one subject is the one now under consideration.

At no time have contractors shown their appreciation of quantities more than at present, and it is a good recommendation for the quantity surveyor's work that respectable builders frequently refuse to tender unless quantities are supplied.

The system that will be described in these papers will be that generally employed by London surveyors. There are, of course, provincial differences, but the writer having made inquiries in different parts of the country, has found a generally prevalent feeling in favour of the London system, even in preference to that in vogue in the district in which the work is carried on. One cannot help thinking that this

preference is largely due to the fact that, while in London the practices of architect and quantity surveyor are generally distinct, in the provinces the quantities are prepared in the architect's offices by an assistant, who is often not fully qualified for the work or who has his attention taken up with other matters.

The process of preparation of quantities is roughly divided into three operations:—First, "taking off," *i.e.*, taking the measurements from the drawings and entering them upon paper specially ruled in four columns; the second column containing the dimensions, the first the "times-ing" or number of times the dimension will repeat; the third for the result of the "squaring," and the fourth and widest for the description of the item, *e.g.*:—

4/	3.0 7.0	84.0	2 in. 4-panel moulded both sides door.

The second operation is that of abstracting, *i.e.*, arranging the items in the various trades under their various headings, and in certain relative positions; this will be more generally described in its proper position.

The third operation is that of "billing" the finished product of the surveyor, *i.e.*, putting the collected items on the abstracts in their proper order and with their full descriptions in the bill, to enable the builder to place his prices against the various items, and to money them out to arrive at a total.

These last two operations are termed "working up," in contradistinction to that of "taking off."

In addition to these there is the work of squaring of the dimensions and the "making up" of the abstracts in addition to the checking at each stage of the working up.

Every surveyor has his own pet order in taking off; some follow out a system that is now almost obsolete, *i.e.*, confining themselves strictly to trades. Others follow a modification of this system by dealing with the carcase first, and afterwards the finishings, *e.g.*, in taking the dimensions of brickwork they will take deductions of brickwork and facings for the openings, leaving the joiners' finishings

to be taken separately; others, again, follow a system whose chief characteristic is "want of system," *i.e.*, taking the various items as the fancy strikes them. All three systems have something to recommend them; the first the ease in abstracting, besides facilitating the writing of the bills, as it is not necessary to wait until the completion of the taking off before commencing the bills; but, on the other hand, the difficulty of remembering every little incidental item when one has left the bulk of the work militates against this system, in addition to the trouble of having to wade through the whole of one's dimensions in the event of variations on the contract, for the purpose of arriving at omissions. The second system mentioned is *theoretically* undoubtedly the best, but again, one is not always fortunate enough, in these days of rushing work, to get the drawings complete when commencing the work, it is therefore necessary frequently to drift, however unwillingly, into system or want of system No. 3, which enables the surveyor to go on with the work shown complete on the drawings in his possession. The chief danger in this last system is that of leaving out some item altogether. However, as the dimensions are simply the means to the end, whichever system is followed (or whatever combination of all three), the great thing for the surveyor to bear in mind is that it is often necessary to refer to the dimensions months, and possibly years, after they have been finished, and that therefore they should be written in such a way that with the drawings before him there should be no difficulty in tracing every dimension. This is greatly facilitated by making numerous headings and sub-headings, and notes to the dimensions themselves. The advantage of this will be obvious in the later chapters of these notes.

Another point the "taker-off" should always have before him is the importance of making his dimensions and descriptions self-explanatory. Never leave the abstractor in doubt as to the meaning—as to whether an item is similar to one before or not. If there are various items of a somewhat similar nature, but not absolutely identical, it is far better to write a full description than to say "as before; but, &c." If one wishes to refer to a similar item previously

taken, unless there is absolutely no doubt to which the description applies, it is well to refer to the column where the first description occurs.

Do not, in "taking off," adopt a "give and take" system—this is a very good rule in many things, but not in quantity taking. It is a very poor excuse, and one that does not beget confidence, when a question is raised as to the sufficiency of an item, to be compelled to allow that this particular item is short and to fall back upon the excuse that "you have an excess in some others." Each item should stand by itself and on its own merits, therefore, let correctness in every particular be the aim of the Surveyor, whether it is in "taking off" or "working up." And this is only attained by conscientiously taking exact dimensions: *e.g.*, if one, in taking the size of a window, is inclined to be too liberal, and if he wishes his dimensions to "hang together" as they should, the *deductions* from brickwork, &c., will be excessive, which means something short in these items, otherwise the result is two different dimensions for what should be identical.

It will be obvious that a thorough knowledge of construction is absolutely necessary before anyone can hope to be able to take up the work of the quantity surveyor with any measure of success.

Having now given some idea as to what is required, we will in the immediately succeeding chapters proceed to consider the modes of measurement, both generally and in the various trades.

CHAPTER II.

General Rules for Measuring.

It may be well, before proceeding to a consideration of the modes of taking the measurements in particular trades, to consider a few general rules that will apply throughout, and also to take note of the forms generally employed in writing the dimensions, for, as will doubtless have been seen by Chapter I., method is a great factor in arriving at such results as are therein set forth as the goal to be striven for by the student.

In the first place, there is one general rule that obtains throughout all measuring, and that is the order of booking the dimensions. In the case of superficial dimensions, such as floors or plastering, or in anything that is billed as a superficial item, the first dimension booked is always the length, and the second the width or height. In the case of cubes, the first dimension is the length, the second the width, and the third the depth or thickness; so that in looking through the dimensions afterwards the surveyor can always see at a glance, by referring to the drawings, the item to which a particular dimension refers. The importance of this will be readily understood, say, in the case of stonework. If the dimensions are not written in some such order as that mentioned it would mean that each would have to be tested as a speculation; whereas, knowing that the length is the first dimension booked, minimises this difficulty by limiting the test to the one dimension first.

4.0
3.0
Therefore, 2.6 would mean that the particular item here

---

booked was 4 ft. wide on the face, 3 ft. from front to back, and 2 ft. 6 in. deep or high.

All dimensions are written as shown in the example given in Chapter I., with the number of times that the item will repeat. If, however, the surveyor finds, after completing a series of dimensions, that—say on another floor—he has

still others identical with these, he resorts to a system of addition known as "dotting on." Example:—

4 /	3.0	2 in. 4-panel moulded both sides door
2 /	7.0	*first floor*
		*2 added for second floor,**

which would mean that the item was multiplied by 6 (the 2 and 4 of first column, added together).

Occasionally it is the surveyor's good fortune, after completing a series and "times-ing" his dimension, to find another series of exactly the same description and number; he then goes still a little further with the "times-ing." As a variation we will take the case of stonework:—

2 /4 /	5.0	
2 /	1.2	
	1.0	Box ground stone sill.
		Ground floor front.
		2 added for end elevation.
		2ced. for first floor; *

in this case the dimension is multiplied by 12. If, however, the second floor contained the same number and description 1 is dotted on to the 2 as follows:—

2 /4 /	5.0	
1 / 2 /	1.2	
	1.0	Box ground stone sill.
		Ground floor front.
		2 added for end elevation.
		2ced. for first floor. *
		Also second floor,

when the dimension is multiplied by 18.

(In the foregoing examples one dimension only is taken out of a series or group, as being sufficient to illustrate the principle.)

This "dotting-on" and "times-ing," judiciously used, is a

* These entries are merely memoranda as to the reason for the added figures in the first or "times-ing" column.

great saver of time in taking off, but should only be resorted to when the whole or nearly the whole of the dimensions in a series or group can be dealt with. If there is any material variation in any of the dimensions or descriptions of many items in a group, it is far better to write the whole down again than to go in for piecemeal adding on, as, in the case of this piecemeal addition, the trouble of tracing one's dimensions at a later date is much increased; and the little time saved at the outset is frequently lost over and over again in the event of some alteration, necessitated possibly by some change in the idea of the architect during the progress of the work. This change of ideas is by no means uncommon, as many surveyors can testify to their cost. The same trouble arises again, when it is necessary to omit an item complete at the settling of the accounts.

The question of "collections" or "wastes," as they are called, is a very vexed one, some surveyors taking a very strong view that "collections" should be made wherever possible, others taking just as strong a view that they should be avoided. Where, however, collections are made, care should be taken to make full notes as to the origin of the various dimensions. These collections are written at the extreme right hand of the description column of the dimensions, thus :—

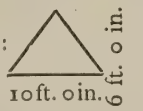
	Drawing-room N.	14.6
	E.	7.9
		.9
		4 6
		.9
		7.9
	S.	14.6
	W.	20.0
	Dining-room N.	16.6
	E.	14 6
	S.	7.0
		3.0
		9.6
	W.	17.6
138.6		138.6

11 × 1½ moulded skirting.

The dimensions making the collection are termed "wastes." These wastes should be checked, both as regards the casting and the writing of the dimension by the person squaring the dimensions, and to enable this to be done the "taker off" should be careful to write his "wastes" so distinctly that there shall be no difficulty in tracing the dimensions in their proper positions.

When measuring a triangle, such as a gable, although it is obvious that the area is half that of a complete rectangle containing the triangle, it is better to write the dimension the full length and height, and in the "times-ing" column to halve it rather than to halve the width or height before booking.

Example:



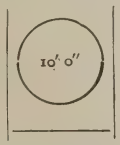
½	10.0		
	6.0		
		30.0	

Would be preferable rather than

	10.0		
	3.0		
		30.0	

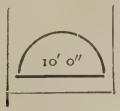
Which, although correct in result, does not show at a glance that the dimension is for a triangle.

In booking a dimension to arrive at the area of a circle, such as a ceiling or floor in a circular hall, say 10 ft. diameter, it would appear in this form :—



Lath, plaster, float and set ceiling.

If a semicircle it would be written thus :—

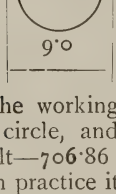


Lath, plaster, float and set ceiling.

In these examples, the first would be multiplied by itself, thus 10 ft. × 10 ft. = 100 ft. sup., this again being multiplied by ·7854, giving the result 78·54 ft. or 78 ft. 6 in.

In the second example, the operation would be similar, but the result halved.

In the case of a cube dimension which is circular on plan, *e.g.*, the digging for a circular cesspool, in which the dimension, for the sake of example, is 10 ft. diameter and 9 ft. deep, it would be written thus:



Excavating and carting away.

The working out would be similar to that described for the circle, and the result multiplied by 9 ft. giving the result—706·86 ft., or 706 ft. 10 in.

In practice it is frequently the rule to multiply the result of the square of the dimensions by 0 ft. $9\frac{5}{12}$ in., thus giving approximately the same result as multiplying by ·7854; but in the case of a large number of circles, or in circles of large diameter, it is better to adhere to the more correct method of the decimal.

It is a good plan, in the event of the surveyor having to settle some point of detail or construction not shown upon the drawings, to make a slight sketch on the margin of his dimensions showing what he has taken. This will be found of great assistance when again referring to the dimensions, as without some such record it is often somewhat difficult at a later date to trace the idea in his mind at the time of taking off.

A point that is frequently lost sight of both by the architect and quantity surveyor is the difference between "p.c." (prime cost) and "l.p." (list price). One frequently sees in bills a sum stated for a certain article at "list price," with no intimation as to the name of the maker or merchant supplying that article, thus giving the parties tendering no clue as to the amount of discount likely to be obtained. It

is therefore well to bear in mind that in cases where no maker or merchant's name is specified the sum provided should be prime cost, *i.e.*, *net*.

Occasionally it happens that in some items, such as underpinning, it is almost impossible—owing to the difficulty of access—to measure exactly what will be required. In these cases the items should be billed as "provisional," and the items thus billed should be entered in the specification in the same form as in the bill of quantities. Where the bills of quantities form part of the contract this precaution is not necessary, as the whole of the quantities are practically provisional.

Do not endeavour to save trouble in writing descriptions by taking your dimensions "full" to cover the increased cost of particular items, but make the descriptions to thoroughly explain the whole of the work involved. It is often well in cases of this kind to allow the item to appear as a number, with all attendant labours, rather than as a measurement.

The writer in the foregoing preliminary notes has endeavoured to impress upon the student of quantity-surveying the absolute necessity of doing his work thoroughly and honestly, and in such a way that it will be a credit to himself and a benefit to his client and to the builder, and he would, on behalf of the student of quantity-surveying, appeal to the architectural student to make his drawings and specifications explain thoroughly his intentions, leaving nothing to the imagination. He will then produce work that will redound to his credit as a business man, keeping down the cost to within reasonable limits by not leaving it to the surveyor to take those unfortunate "covering items," which mean something to *cover* the cost, whereas if the intention of the architect was clear, it is more than probable that something less costly than what had been included in the "covering item," was what was required. Another point it will be well for the architect to consider, and this will be to his own advantage as well as to that of the surveyor, and that is figuring the drawings; and here again there is a system that will save infinite trouble in the future, viz.: to first of all settle the total outside dimension and

work the internal dimensions to this total. One would then not have to contend with those discrepancies that are so frequently found, and form such an element of uncertainty in taking the dimensions.

One final appeal to the architect. In figuring the sizes of internal openings, please make it distinctly understood whether the dimensions are the sizes of the joinery or between the brickwork. They ought, of course, in most cases to be the former, but experience shows that the caution is not entirely unnecessary.

CHAPTER III.

Modes of Measurement.

EXCAVATOR, CONCRETE, AND DRAINS.

Removing Top Soil.—Where it is necessary to remove only the top or vegetable soil (generally to a depth of from 6 in. to 12 in.), it is usual to measure this item *in yards superficial*, stating the depth. This is often taken when the top soil is vegetable, even when the earth below same is to be removed.

In taking the dimensions for this it is necessary to add beyond the outside dimensions of the building the projections of the footings and concrete. This will apply also to excavation, &c., described in the next clause.

Excavating to Surface, Basement, &c., per Yard Cube.—In measuring, the depth to be taken down to the underside of the bed of surface concrete, see Fig. 1.

Trench Excavation, per Yard Cube, measured the width of the concrete, to commence at the bottom of the excavation described in the last clause.

Unless shown or described to the contrary take the trench excavation and concrete of sufficient width to take one course of footings to each half brick in thickness of the walls (this is equivalent to making the bottom course twice the width of the wall), and allow 6 in. projection on each side beyond the bottom course of footings. (See Fig. 1.)

Where there is no concrete make the same allowance as a "working space."

The trenches for external walls will be the same length as the walls, but for internal walls they will be less by the projection of footings and concrete of every wall they intersect. (See Fig. 2.)

In this case the deduction is 1 ft. 3 in., that being the projection for a two-brick wall.

General Notes for Excavation.—Describe excavation on

the site of an old building, or wherever old foundations or anything of a foreign character is likely to be met with, as "including grubbing up and removing old foundations," or "old drain and other pipes," or "roots of trees," as the case may require.

Where old buildings are to be pulled down it is usual to take the excavating from ground level, making a note in the quantities to this effect, as the "housebreaker" leaves the débris up to this level, unless a special contract is made to the contrary.

If, owing to the confined situation of the work, or the

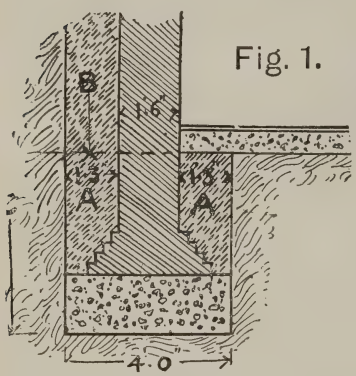


Fig. 1.

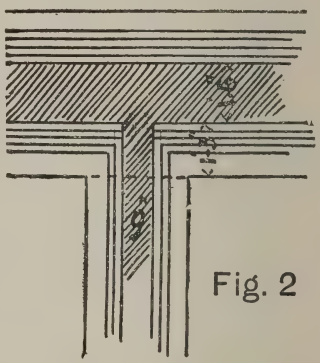


Fig. 2

excavation is inside an old building and requires "Basketting" out, embody this in the description.

In taking the excavation and concrete for projections such as chimney-breasts, &c., do not forget to allow beyond the width of the brickwork the spread for footings and concrete at both ends, which is generally the same as that of the wall upon which the projection occurs.

Carting away and filling in.—Take the bulk surface and basement excavation as "filling into carts and carting away," or "wheeling and depositing," as the case may be. If deposited, state within how many "runs," * and whether

* A "run" is 20 yds.

the earth is to be spread and levelled upon the site or left in heaps, and whether the vegetable soil is to be kept separate from the remainder.

Deduct from the foregoing items of "carting" or "wheeling" the quantity required for filling in above the concrete around the foundations, and describe as "throw out, return fill in, and ram around foundations." This dimension for the trenches will be the width of the trench less the thickness of brickwork as at A-A fig. 1, and in the case of bulk excavation the projection of the concrete foundation from the face of the wall as at B.

Extra Depths.—As the height of a "throw" is 6 ft., any depth below this requires staging at intervals of 6 ft., therefore take an item of extra value between these intervals below the first 6 ft. as "extra value for excavating below 6 ft. and not exceeding 12 ft. deep," and "ditto below 12 ft. and not exceeding 18 ft. deep," and so on, stating, in the event of varying levels around the building from what point this depth is measured.

Example: Trench 20 ft. long, 4 ft. wide commencing at a depth of 7 ft. and going down to a depth of 18 ft. deep.

20 0 4.0 11.0	Excavating to trenches (*according to description*).
20.0 4.0 5.0	Extra value on digging below 6ft. and not exceeding 12ft. deep.
20.0 4.0 6.0	Ditto, below 12 ft. and not exceeding 18 ft. deep.

Filling in.—Where the surface of ground to receive surface concrete requires making up, take an item of filling in *in yards superficial* if less than 12 in. thick, *in yards cube* for any greater thickness, stating whether the filling is of earth or brick rubbish.

Strutting and Planking to basement excavation is measured *per foot run*, giving the depth. *Note.* The depth must be down to the bottom of the trench (C Fig. 1), and *not* to the level of general excavation for basement, and the other side of the trench is also to be measured in the same way. Other trenches are taken *per foot run* for both sides, giving the width and depth of trenches. It is often advisable to *number* the strutting and planking to pier holes, giving the sizes on plan and the depth. Mention particularly if the strutting and planking is to support sides next a roadway.

Strutting and planking to trenches for pipes is generally included with the item.

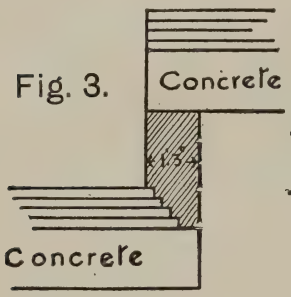


Fig. 3.

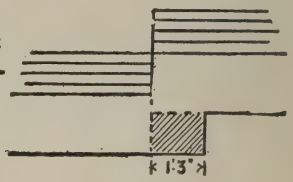


Fig. 4.

Trenches for Pipes, per yard run, stating for water or gas pipes, and giving the average depth; that in roads and paths kept separate, and a note made as to this item, including lighting and watching and making good surface.

Trenches for drain-pipes are better included with the drain-pipes.

Concrete in Trenches per yard cube.—Note. That wherever there is a jump in the concrete it will be necessary to take at the end of the concrete at the higher level a superficial item of "temporary rough boarding to sides of concrete." Similar boarding will have to be taken wherever the concrete comes above the surface of the ground. Note also that additional concrete and excavating and removing will

have to be taken at jumps as in the examples figured above.

The hatched portions show the additional concrete required. In the case of Fig. 4 the length is usually taken to be the projection of the footings and the concrete combined, *e.g.*, in the example shown, which is for a two-brick wall with four courses of footings, this would be:—$2\frac{1}{4}$ in. (projection of each course of footings) $\times$ 4 = 9 in. + 6 in. (projection of concrete) = 1 ft. 3 in.

Surface Concrete, if under 12 in. thick, *per yard superficial*, describing whether to falls. *Note.* That if the surface concrete is stepped, boarding will have to be taken as described to trench concrete but *lineal*, stating the thickness of the concrete.

Filling in over vaulting, trimmer arches, &c., if averaging under 12 in. thick *per yard superficial*, if averaging over this thickness, as in pockets of groining, *per yard cube.*

Concrete fireproof floors, per yard superficial, stating the thickness and keeping the different floor levels separate, either describing the floor levels or giving the heights above ground.

Take rough-boarded centering for these floors. It is well to give the heights of the stories they cover, to give the contractor some idea of the quantity of strutting necessary, although where there are main girders it is usual to strut the boarding up from the lower flanges or to support with hanging irons from the upper flanges of these girders.

If the soffits are plastered they may be left as found after the centering is struck, but if to be left plain or lime-whited take "cleaning off and filling in holes with fine concrete."

Note.—Boarding as described for surface concrete will be necessary to the edges next well holes, &c.

Concrete casing to girders, &c., per foot run, giving the size of the girder and the size of the concrete casing. *Note.* Rough temporary boarding, as support, to be taken to soffits and sides.

Drain pipes, per foot run, giving the sizes and description of the pipes and of the jointing, including with the description the average depth of the digging required.

Note that there are other factors in arriving at the average depth than the falls of the pipes, such as the levels of the ground, and also note that where the falls of the drain pipes vary a fresh average must be commenced.

If the pipes are bedded on or covered over with concrete, measure this at *per foot run*, stating the size of the pipe and the minimum thickness of the casing, or give the size of the bed and covering, and do not forget to allow the extra depth of digging required for the concrete bed.

If the trench for the pipes is in the road or path state this as described for gas and water pipes.

State also how the surplus soil is disposed of after filling in and ramming as described in general excavation.

Number bends, junctions, diminishing pipes, &c., as "extra over inch pipes for &c.," and note that a small junction out of a larger pipe is taken as the larger size.

Give a full description of the gullies, or better still, give the makers' names and list prices, and include with the item the excavating and setting (describing whether in brickwork or concrete) and also the connection with drain.

Number also connexions of soil, ventilation, and rain pipes with drain, giving a full description of the method of connexion to each.

Inspection Chambers and Cesspools.—If of large size measure in detail and keep the whole of the items together under a heading. The system of measuring will be as described under their respective headings in the various trades, carefully noting the channels in bottom, the sizes, and description, both as regards material and the shape in section and on plan.

For small inspection chambers it is sometimes convenient to number the item complete, with the exception of the smiths' work (such as hand and foot irons and covers) and masons' work (such as cover stones), with a complete sketch in margin, and describing the channels and showing the arrangement and sizes of these on a sketch plan. In this case include strutting and planking, and state how the surplus earth is disposed of, as before mentioned.

CHAPTER IV.

MODES OF MEASUREMENT.—*Continued.*

BRICKLAYERS' WORK.

BRICKWORK. Walls 1 brick (9 in.) thick and over are taken at *per rod superficial* (272 ft.) reduced to $1\frac{1}{2}$ bricks ($13\frac{1}{2}$ in.) thick. Half brick ($4\frac{1}{2}$ in.) walls are measured *per foot superficial*, as are also 1 brick (9 in.) walls where they are faced both sides, the reason for this in the latter case being the extra labour in selecting the headers so that they present a level face on both sides with the stretchers—this is especially the case with glazed work. It is well, in the event of bricks from unknown localities being used to obtain particulars as to thickness, as this affects the dimensions of stonework, the bricks in different localities varying for four courses in height from 10 in. to 1 ft. 2 in., the usual height in London and neighbourhood being four courses to one foot.

In the provinces the brickwork is frequently reduced to 1 brick thick and billed at *per yard superficial.*

In measuring the height of a wall which is topped by a wood plate measure to the top of the plate where this does not exceed 3 in. in thickness to pay for the cost of bedding plate. If more than 3 in. allow 3 in. only beyond net height of brickwork.

Allow 3 in. for the waste in cutting up the rake of a gable.

To arrive at the thickness of the footing courses take the average between the bottom and top courses of the footings.

Example (Fig. 5): 2 brick wall with four courses of footings:—

Top course.	$2\frac{1}{2}$ Brick.
Bottom course	4 Brick.
	$2)6\frac{1}{2}$
	$=3\frac{1}{4}$ Brick average.

Unless shown (intentionally) or specified to the contrary, take one course of footings to each half brick in thickness of the wall.

In abstracting brickwork it is usual to have columns headed "1 brick" and "1½ brick" respectively, with their corresponding deduction columns, and all thicknesses are reduced to one or the other of these thicknesses—*e.g.*, 3 brick, the dimension would be twiced by the abstractor, and the result put into the 1½ brick column; 2½ brick, the dimension would be put in both the 1 and the 1½ brick columns. Reductions for other thicknesses will readily occur to the surveyor.

In measuring, take the length of the walls across the openings, and irrespective of chimney-breasts and other projections. Projections are taken afterwards and openings deducted when the work to the openings is taken.

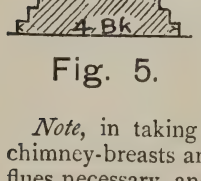


Fig. 5.

It is well when measuring brickwork (to avoid complications) to take the brickwork up to defined lines. The first (say) up to the general basement or ground floor level, and then generally floor by floor to the top, the projections being taken with each floor.

Note, in taking brickwork from floor to floor, that the chimney-breasts are large enough to include the number of flues necessary, and also examine drawings to find whether it is necessary to take arches to carry the flues from one point to another. The architect will expect the surveyor to notice any omission of this character.

It frequently occurs that a chimney-breast commences at a level above the ground, or is wider on one floor than on the floor below (owing to the increase in the number of flues). Take York (or other hard) stone corbelling to carry this chimney-breast, or the extra width, as the case may be, if it is more than can be corbelled out in brickwork.

Keep the brickwork behind stonework separate, and describe as "in backing to stonework, including cutting up to same."

Brickwork in raising to old walls is kept separate from the remainder and described as such to enable the contractors to put down such a price as will pay for the *extra* scaffolding required, owing to the fact that the scaffolding has to commence at a lower level than the brickwork, and therefore the proportion of scaffolding for brickwork in raising is larger than that required for brickwork commencing at the foundations.

Take a superficial dimension, *i.e.*, the length by the thickness of the walls raised as "preparing tops of old walls to receive new work."

Brickwork on girders should also be kept separate for the same reason as brickwork in raising.

Brickwork in cement, unless the whole of the brickwork is in cement, is measured first as brickwork in mortar and another measurement taken of the portion built in cement as "Extra value only for reduced brickwork being in cement." Frequently in writing the dimensions it will be found that some dimensions may be booked as "Brickwork in cement," in this case the item is abstracted in the columns both of "brickwork in mortar," and also of the "Extra value in cement."

Deductions of Brickwork for Window Openings.—For sashes and frames—Take deduction of the outer thickness up to the face of the frame, the size shown from top of sill up to the average of the rise of the arch (if the arch is of very flat sweep up to the springing only), and the remaining thickness a dimension 9 in. wider and 3 in. higher than the outer thickness.

Example (Fig. 6):—

3 0 6 0		Deduct $\frac{1}{2}$ brick.
3·9 6.3		Deduct $1\frac{1}{2}$ brick.

In the event of the frames showing the full width outside, as is frequently the case in the prevailing style of architecture, the recess is usually not more than $2\frac{1}{4}$ in. wider on

each side, in this case the order is reversed and the larger deduction is taken outside. Example (Fig. 7):—

3·0
6·0
2·7
5·9

Deduct 1 brick.

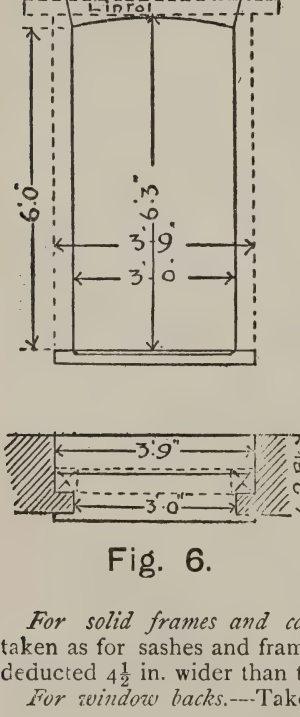


Fig. 6.

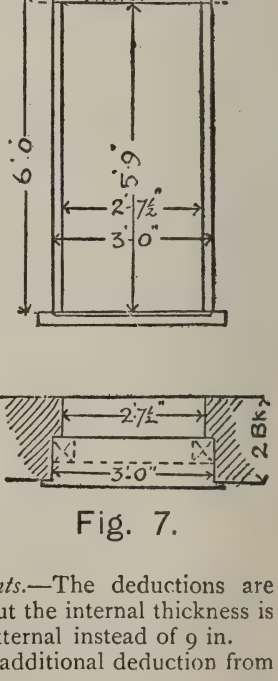


Fig. 7.

For solid frames and casements.—The deductions are taken as for sashes and frames, but the internal thickness is deducted $4\frac{1}{2}$ in. wider than the external instead of 9 in.

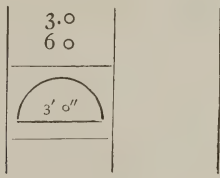
For window backs.—Take the additional deduction from

the bottom of previous deduction down to the floor, of the depth of the recess.

For Doorways.—If with linings take the deduction 3 in. wider and 3 in. higher than the size of the door, but if with solid frames take the deduction as described to solid frames and casements.

For Fireplaces and Recesses the sizes and depths shown. If recesses with semi-circular heads, take up to the springing in one dimension, and the remainder as a semicircle, as described in Chapter II.

Example: A recess 1½ bricks deep, 3 ft. wide, and 6 ft. to springing, *i.e.*, 7 ft. 6 in. to crown, would be booked as follows :—



Deduct 1½ brick.

The arch and centering to be taken here as will be described under their respective headings.

Note.—That brickwork is taken across the recess to allow of this deduction.

No deductions are taken for flues unless of exceptional size.

The deductions for stonework will be dealt with in the "Mason."—(See p. 38.)

Hollow Walls.—Take the brickwork of the combined dimension of the two thicknesses; thus a hollow wall formed of a 1 brick and a ½ brick is measured as a 1½-brick wall, and the hollow measured separately *in yards superficial*, as "extra to forming hollow, &c.," stating the width of the cavity, the description of the ties, and the distance they are apart.

Deductions for openings are usually not taken in this item, but are allowed to set against the material (forming stops to hollows around) and labour in forming the openings.

Note.—The brickwork below a hollow wall is a ¼-brick

($2\frac{1}{4}$ in.) thicker (the hollow generally being 2 in. to $2\frac{1}{4}$ in. wide) than for a solid wall of the same number of bricks in thickness, and, unless specially figured or described, allow this extra on the digging and concrete.

Circular Brickwork.—If of flat sweep (not requiring the bricks to be cut), take both sides of the wall as "extra to circular rough face of brickwork (both faces measured)" *in yards superficial*, except where faced, in which case describe the facing circular. If of quick sweep take the brickwork separately as "circular on plan," giving the radius and the number of templates required, with the radii and lengths.

Thickening old walls, per foot superficial.—Stating the thickness up to one brick and including with the item labour, cutting and toothing and bonding and extra material for bonding. Where more than one brick in thickness as in chimney-breasts, &c., take the brickwork allowing $\frac{1}{4}$ brick extra for bonders and take an item of "cutting, toothing, and bonding new work to old" *per foot superficial*, the brickwork being billed with the bulk except where it is in somewhat small quantities, when keep separate as "built against old walls in (chimney-breasts, &c.)." *Note.* Thickening and work next old walls should be built in cement.

Brick Vaulting Trimmer Arches, &c., per foot superficial, stating whether in mortar or cement. Groin points in vaulting take at *per foot run*, and state if fair or rough, and the thickness of vaulting.

Rough Cutting, per foot superficial, to be taken up all rakes (as to gables), skewbacks for vaulting and arches, and splays over 6 in. wide, deductions from this being made for cutting in face work as described to cutting in facings.

Fair Face and Limewhiting (or Distempering), per yard superficial.—Take the surface shown describing the joint. If to soffit of vaulting describe as "cleaning off soffit of vaulting, pointing, and (once or twice) limewhiting (or distempering)."

Damp Course, per foot superficial, stating whether slate or asphalte. If of slate state the number of courses (of slate) and if cement bed between, the thickness of bed. If of asphalte describe make and thickness, and include running rules with the description.

Vertical Damp Course, per yard superficial.—Describe make and thickness, but as vertical asphalte is frequently put on in two thicknesses, state if this is so, and the total thickness, and include in the item for raking out joints to form key.

Cement Weatherings, per foot superficial.—If 9 in. wide or over, if under this width, *per foot run.*

Rough Oversailing Courses, per foot run.—Taking each course.

Raking out and Pointing to Flashings, per foot run, keeping that to stepped flashings separate.

Squints, Birdsmouths, Chamfers, &c., per foot run.—If plastered, describe as "rough;" if exposed, as "fair."

Chases for Pipes, per foot run, stating the size, and if in new or old walls.

Cutting, Toothing, and Bonding, per foot run, stating the thickness of the walls.

Cutting and Pinning Edges, per foot run.—State thickness, if stone or slate, and if to fair brickwork or facing.

New Piers on old Wall, per foot run, giving the size and including "cutting, toothing, and bonding, and extra materials for bonders" with the item.

Flue Pipes, per foot run, giving diameter and description, and stating how jointed, and include cutting and fitting brickwork around, numbering the bends as "extra."

CHAPTER V.

MODES OF MEASUREMENT.—*Continued.*

BRICKLAYERS' WORK.—*Continued.*

Numbered Items.

Cutting and Pinning Ends of Timbers.—Take these only when not built in as the work proceeds.

Ends of Rolled Joists and Girders.—State if to fair brickwork.

Ends of Steps.—Take these cut and pinned or built in and made good to. State if in facings.

Holes through walls.—State if for lead or drain pipes. If for drain pipes state if eyelets turned for these. State also if brickwork is faced (and the description of facing) one side or both sides, and give thickness of walls.

Small Corbels under ends of timbers, &c., taking as labour and materials and giving the size.

Discharging Arches or Arches over Internal Openings.—Take as extra over ordinary brickwork, and give lengths and average same on abstracts keeping flat, segmental, elliptical, and semicircular separate, and state whether axed on in rings, and give in addition to the length the width of soffit and the height, and state if they include cutting.

Note.—That for discharging arches over lintels, cutting must be taken to soffit as well as crown. If in cement take this as an "extra" as described previously, or include with the item. Centering will not be required for arches over lintels.

Setting Stoves.—Average the widths of the openings, and keep various descriptions of stoves separate, stating whether tile cheeks and any special work required.

Setting Coppers.—Give size of copper, and include setting of furnace work, state also size of brick setting and the

shape (whether with circular front) and describe whether pointed or faced with any description of brick different to the bulk of the work, or rendered in cement.

Flues Cored and Parged.—If of exceptional lengths take an average, not otherwise.

Chimney Pots, giving size and description, or stating p.c. or l.p., and include the flaunching.

Cramps for Door Frames.—Give size, and length, and description. Although this is smiths' work, it is generally billed in the bricklayer.

Frames Bedded and Pointed.—Keep door and window frames separate, also in sizes as "ordinary" frames, "large" ditto, and "extra large" ditto. "Large" over 24 ft. superficial, and "extra large" over 36 ft. superficial. If over 48 ft. superficial the size should be stated.

It is a good plan as a variation of the foregoing to average the girths of the frames, the girths in the case of door frames being the length of the head and jambs, and in the case of window frames of head, jambs, and sill, and put same in one item, keeping, of course, the door and window frames separate. The sills of window frames are usually bedded in white lead.

State whether bedded in lime and hair, or cement and hair, also whether pointed one or both sides, and whether either or both sides next stonework, and if screeded.

Hoop Iron Bond.—This is measured by the foot run, making an allowance for laps, and afterwards weighted, and appears in the bill in cwts. Occasionally a note is inserted at the end of the item in parenthesis giving the number of yards lineal.

Pavings, &c.

Pavings, per yard superficial.—If brick:—Give description, state whether flat or on edge, if herring-bone, and also whether set in mortar or cement. If laid herring-bone take the girth of the room by 3 in. as a superficial dimension and add to the bulk as an allowance for waste.

If tile:—Give full description both as to size and quality, and state whether laid in mortar or cement. In the case of ornamental and tesselated pavements, give the p.c. price,

and include, with the item, for package, carriage, and laying, and take a cement bed for the tiles, giving the thickness. All p.c.'s should state, too, where this price is, *i.e.*, whether at the manufactory, or in London, or otherwise, to enable the builder to make the proper allowance for carriage. It is also well, even where there is a p.c. price given, to give the description ; this gives some clue to the amount of labour in laying.

State if paving to falls, and take an item of cutting at intersection of falls at *per foot run*.

All rectangular cutting in pavings is included with the item (with the exception above noted) which should state this, and also the fact that the item is "measured net" ; but raking, cutting, and waste is taken *per foot run*.

Asphalte, per yard superficial, giving description and thickness, and describing if to falls. Where there are asphalte skirtings, take these at *per foot run*, giving the height and thickness, and note that the joint of brickwork must be raked out for the turn in of the top edge ; embody this in the description. Take mitres, &c. ; also take asphalte angle fillet at junction of skirting with paving at *per foot run*.

Tile wall lining, per yard superficial.—Give size and full description or p.c. as described for pavings. Take the lengths as multiples of the widths of the tiles, include cuttings, or take *net* and take an item *per foot run*, as "cutting and waste at internal angle." Take any items of cutting and fitting as *numbers*, and also take angle beads, cappings, &c., *per foot run*, with the angles, returned ends, &c., as *numbers*.

Facings, &c.

Facings, per foot superficial.—Take these as extra over ordinary brickwork over all the surfaces showing, including in reveals, describing the bricks and the pointing both as regards colour and form, also state whether the pointing is done as the work proceeds, or whether the joints are raked out and afterwards pointed.

In gauged work describe whether set in putty, or in shellac for carving.

In the case of glazed facings, owing to the great cost of the bricks, it is usual to make an allowance of $2\frac{1}{4}$ in. at each end of the wall, to pay for the extra material for bonding.

With half brick ($4\frac{1}{2}$ in.) walls whether faced one or both sides, and one brick (9 in.) walls faced both sides, include also the brickwork, and measure at *per foot superficial.* Keep circular facing separate, giving the radius.

Where, as is sometimes the case, there are bands or quoins of facings varying from the bulk, take these at *per foot superficial* (taking the average width of the quoins by the height) and deduct from the general facing and describe as "in bands" or "in quoins" as the case may be.

It is frequently better to bill the quoins at *per foot run*, giving the averages as showing one average face in. wide, or two faces each average in. wide, or one face average in. wide, and return in. wide, as the case may be.

Arches, per foot superficial.—Measure the girth of the soffit by the width and the *average* girth of the face by the height, and describe whether in rings, axed or rubbed and gauged; and also the shape, whether flat, segmental, semi-circular, pointed, &c. *Note.* Deduct from the facing the area of the face of arch, and describe the arches as "Extra over ordinary brickwork."

Moulded and splayed cuttings, per foot superficial, if over 12 in. girt.

Cuttings, per foot run.—Take "Raking cutting and waste" (stating in what facing it occurs), to all rakes (such as gables) where the raking joint is exposed. Cuttings in facing include the cutting $4\frac{1}{2}$ in. through from the face of the wall; therefore, where rough cutting has been taken, deduct the length by this width from the rough cutting. Take a similar item at the springing of arches, except where this is horizontal, as "Raking cutting and waste to skew-backs," and the girth of the crown of the arch as "Circular cutting and waste."

Squints and birdsmouths, per foot run.—State the kind of facing in which these occur, and note that in glazed facing, and in bricks that will not "rub," they will have to be

purposely made. State the number of moulds required for these (one for each variation).

Moulded angles, splays, &c., to jambs and arches, per foot run, if under 12 in. girt.—State if cut and rubbed or moulded, and give the girths. If moulded, and can be selected from catalogue, give number and maker's name. Keep circular work separate and *number* mitres, stops, &c.

Moulded Strings and Cornices, per foot run.—Take extra brickwork for the projection, and describe these as "extra over ordinary brickwork," deducting the facing for the height of the course or courses. State whether all headers, and describe the pointing. Describe whether cut and rubbed, or moulded; if the latter, and can be selected from catalogue, give the number and maker's name.

A cornice of more than one course is better taken complete as a series, giving the height and projection, and stating the number of courses. Frequently a sketch in the margin is advisable in this case. Describe the pointing. If the string or cornice is circular on plan, state this, giving the radius; and, if circular on elevation, as a label to an archway, describe this also, as it is frequently necessary to have narrow bricks to keep a good line. *Number* mitres, returned ends, &c.; also short lengths as in breaks around pilasters.

Plinth Cappings, per foot run.—Take as described for strings, and take the extra brickwork below capping for the projection. It is not usual to increase the footings for this, so, unless otherwise shown or described, take from the footings. *Note* that the length of this extra brickwork is longer at each external, and shorter at each internal, angle, by the projection of the plinth; and that at each external angle there will be an addition, and at each internal angle a deduction, of the facing to the extent of *twice* the projection of the plinth by the height of the facing. *Note* that, owing to the "give and take" of the angles where the plinth runs *entirely* round a building, and where the angles are all right angles, however much broken up by projections, there will never be more than an allowance for four external angles required.

Oversailing Courses, per foot run. — As previously

described in ordinary brickwork, but an allowance must be made for facing to underside, and also for the extra at the angles as described to plinths.

Pilasters, per foot run. Either take extra brickwork and facing for the projection, and describe the item as "extra labour," giving the width of projection, or take the item as "extra labour and material," giving width, &c., as last described.

Brick Copings, per foot run, and include the *labour and material*, describing the bricks, and if with tile creasing one or both sides, and include cement fillets one or both sides, as the case may be.

Number small items, such as cutting and fitting to stone moulding under 12 in. girt, corbels, window aprons (if small), key blocks, and all those items where a measurement does not give the contractor a proper idea as to the value of the work.

Underpinning.

Measure the individual items for this as previously described, but keep all separate as in *underpinning*. It is usual to include the strutting and planking with the excavation. In measuring the excavation, allow beyond the face of the wall a width of not less than 2 ft. as working space, and *deduct* this quantity from the ordinary excavation. Take an item of cutting off old footings and concrete, and take on the top of the underpinning a superficial item of the length by the thickness of the wall, as "wedging up with slates and cement (or whatever else is particularly specified) at top of underpinning."

It is generally advisable to keep all the items of underpinning together at the end of the bill under a separate heading, stating that "The following is in underpinning," and that the price is to include for the work being executed in short lengths, and for the strutting, planking, needling, and shoring, and everything requisite for the safety of the work.

CHAPTER VI.

Modes of Measurement—*Continued.*

masons' work.

Stone Dressings.

It was frequently the practice in times past to allow in the measurement 1 in. each way beyond the net size of the stone to allow for waste, but the usual practice at the present time is to take the measurement of the stone *net*, the smallest size of the block out of which the work can be obtained, and this fact should be stated in the heading.

One system of measuring is to describe the stone as including *all labour*, keeping the various items separate (according to the labour on the stone) under various headings, as doors, windows, cornices, &c., and subdividing, as in jambs, heads, sills, arches, &c., describing as "sunk," "moulded," "sunk and moulded," &c., generally at *per foot cube*, but with various items, of which there is any large quantity of a similar character, as strings, sills, mullions, transoms, &c., at *per foot run*.

It is sometimes a good plan in following this system to give sundry sketches in the margin of the bill showing the character of the work. The one drawback to this system, is the difficulty of properly subdividing the work, so as to really give the contractor the exact amount of labour; thus making the items of a somewhat "sporting" character, a state of things which it is the object of a good bill of quantities to avoid. Another disadvantage is the difficulty in the case of any large variation, of arranging under which heading the new items should be placed. It is evident that, taking all things into consideration, the best system is the older one of measuring the stone as a rough block, and taking the labour in detail, as will be hereafter explained.

Any stone under 3 in. thick should be measured at *per*

foot superficial, and if any of the work is in very small pieces keep this separate and make a note of the fact in the item.

If any stones are hoisted more than 40 ft. above the ground take an extra item for this, giving the heights at 20 ft. intervals thus, "40 ft. to 60 ft.," "60 ft. to 80 ft.," &c.

Keep all stone over 6 ft. in length separate and describe as in "scantling;" if much in excess of 6 ft., state the length. Should any stones be more than 6 ft. in more than one direction, mention the sizes of the stones thus: feet cube stone in ft. by ft. by ft. State whether stone is set in mortar or cement. It is a good plan when one has not a detailed set of drawings to measure from, and where the surveyor has to settle the beds of the stonework himself, to make a rough tracing of the elevations and mark the jointing on them, numbering each block in succession, these numbers to correspond with those against the items in the dimensions as measured; this will be found of incalculable value for future reference in the event of questions being raised, the aforesaid tracing being attached to the dimensions to be at hand when wanted. In the cases of strings, cornices, &c., where the jointing is not shown, for the purposes of measurement, calculate the stone to be in lengths of 3 ft.

The following is the mode of measurement when the stone is taken as rough block with the labours on same measured separately.

Describe in the heading the finish of the face work, whether "rubbed," "dragged," or "chiselled," or any other finish that the architect may specify.

Stone per foot cube.—Describe as "stone (no labour) including waste, hoisting and setting in mortar or cement)."

Beds and Joints per foot superficial.—Take one bed and one joint to each stone and describe as "one surface measured for two," or twice the item, and make a note "each surface measured."

Circular Beds and Joints, per foot superficial.—Take this to the backs of voussoirs and any beds or joints to *convex* shape where these are not exposed. The portions exposed wil be circular plain face, as hereafter described.

Sunk Beds and Joints, per foot superficial.—Take this wherever the joints are sunk back from square of the stone, such as to the springers of a gable coping or the joints to arch stones.

Rebated Sunk Joints, per foot superficial.—This is an item frequently included with the last, but the labour in forming the rebate being so much more than that for a mere splay, more than warrants the distinction. This labour occurs in jambs of doors and windows in the recesses for frames.

Circular Sunk Beds and Joints, per foot superficial.—Take this to soffits of voussoirs and any beds or joints to *concave* shape where not exposed. When rebated take separately as last described.

Half Sawing, per foot superficial.—Take to the back of the stone where not exposed an item of half sawing except in those cases where the stone is of such a description that sawing is not practicable; in this case take "rough work to backs next brickwork, &c." "Half sawing" is sometimes taken to the front of the stone as a preliminary labour for moulded work, &c.

Plain Face, per foot superficial.—Take this on the exposed faces of the stone. If this labour occurs on a surface for which "bed" or "joint" has been previously taken, deduct this surface from "bed" or "joint," or "half bed" or "half joint" according to the system followed in measuring the beds and joints.

Circular Plain Face, per foot superficial.—Take this to the backs of voussoirs where exposed, and also to those stones wherever the face is circular to convex shape.

Circular Circular Plain Face, per foot superficial.—Take this where the surface is circular, both on plan and section to convex shape, such as the *exterior* of a dome.

Sunk Face, per foot superficial.—Take this when any part of the exposed face of the stone is sunk below the general surface, such as weatherings, splays, &c.

Rebated Sunk Face, per foot superficial.—This occurs at an internal angle in plain work, *e.g.*, a plain pilaster worked on the face of a stone wider than the pilaster, and should be kept separate for the reason given for rebated sunk joints.

Circular Sunk Face, per foot superficial.—Take this to any of the last items where the work is circular and also to soffits of arches where exposed and any circular work of a concave form.

Circular Circular Sunk Faces, per foot superficial.—Take this where the surface is circular both on plan and section to concave shape, such as the *interior* of a dome.

Stopped Sunk Faces, per foot superficial.—Take this where the work described as sunk face does not run through, but is "stopped" as at an internal angle or stop.

Circular Stopped Sunk Faces, per foot superficial.—Take as a variation on "circular sunk face" as last described.

Moulding, per foot superficial.—Taking the girt of the moulding by the length.

Circular Moulding, per foot superficial. — Take on arches, circular pediments, also cornices, &c., circular on plan, &c.

Circular Circular Moulding, per foot superficial.—Take this where the mouldings are circular both on plan and elevation as to an arch in a circular wall.

Stopped Moulding and Circular Stopped Moulding, per foot superficial. Take this where the moulding does not run through, but is stopped as at an internal angle or stop. *Note.* That in an "undercut" moulding the work at *all* angles, both external and internal, will be "stopped."

Rough Sunk Work, per foot superficial.—If the moulding or sunk face is much sunk below the surface of the stone, take this as a preliminary labour. Some surveyors, however, make a note that "all labour to sunk and moulded work includes all preliminary labour."

Bosting for Carving, per foot superficial.—Take this over the rough outline of the shape on the carving.

The following Items are measured at per foot run.—Plain faces under 4 in. wide; throats, grooves, sinkings under 4 in. wide; mouldings under 6 in. girt; burning in lead flashings (*Note.* Groove is generally included with this); working running ornaments, dentils, &c. (*Note.* Give sizes of dentils and the width apart); keeping "circular" and "stopped" work separate, as described for the superficial measurements.

Items Billed as Numbers.—Short lengths of sinkings, mouldings, &c., described to be measured at per foot run, are generally numbered when less than 12 in. in length, the lengths averaged and described as stopped one or both ends, as the case may be. Stops, mitres, &c., to sinkings and mouldings; the widths or girts averaged—describing stops as plain, splayed, or moulded, or against plain face, splayed face, or moulded face, as the case may be. In addition to the foregoing, perforations, as for flues, rain pipes, &c., are numbered, giving the sizes and the thickness of the stones through which the perforations are cut.

Take double cement plugs, where required, to vertical joints (giving the lengths, which are "averaged" by the abstracter), also slate dowels, copper cramps (size and lengths); also lead plugs for screws, letting in and leading ends of railing bars, fangs of hinges, bolt sockets, and all sundries in connexion with the stonework.

Working corbels, modillions, crosses, &c., are taken as an "extra labour." In these cases sketches are advisable, to give the contractor some idea as to the labour involved.

Carving.—As this is not an item for a competitive price, and as architects usually select a special carver to do the work, the best plan is for the surveyor to make a separate bill for the carving, describing the position to enable the work to be traced upon reference to the drawings, and before the bills go to the contractors to get a price for this from the carver. This price is then billed as a "provisional sum," and a note made to the effect that the contractor is to allow the use of all scaffolding, &c., for the carver. In the carver's bill make it clearly understood that the work is to include all models. Diaper work and surface ornament in any large quantity is measured at *per foot superficial.* Running ornament in strings and cornices *per foot run*, whilst corbels, spandrels, caps, &c., are *numbered*, giving the extreme sizes.

Items Measured as Including Stone and Labour.

Ashlar, per foot superficial.—Give the average bed, and state the proportion of through stones (*if any*) in

addition. The *extra* for these through stones is sometimes measured at per foot cube as before described, thus leaving the description of the ashlaring to cover only the average *general* bed.

Take *raking and circular joints* in ashlaring at *per foot run*, including waste.

Block Walling, per foot superficial.—To be measured as such, giving the thickness where the wall is entirely composed of dressed block stone, *i.e.*, where there is no core or backing. *Raking and circular joints* in this are measured at *per foot run*, including waste.

Filling into Cells of Groining, per foot superficial, stating the thickness and including the requisite centering. Take *cutting and fitting to groin ribs* in this at *per foot run*, including waste.

Shafts, per foot run.—To be taken in this form where under 9 in. diameter, measuring the dowels, ties, &c., separately.

Even when the stone and labour are measured in detail, keep any items where the work is in very small pieces, as in "sedilias," "reredoses," and other similar work, separate under a heading, as "the following in sedilia" (or reredos, &c., as the case may be).

Waller.

Walling, per yard cube, if over 15 in. thick; if under this thickness, measure at *per yard superficial*, describing the stone, and also whether "rubble," "coursed," or otherwise, and describe if in mortar or cement. Keep work below ground and in foundations separate.

Facings, per yard superficial.—If of the same stone as the body of the walls, but a different finish, take as "extra over walling;" but if of different stone take as labour and materials, and *deduct* the walling.

Quoins, per foot run.—Take these as "extra over facing," giving the sizes and also the description of finish to face.

Arches.—Number these as extra over walling or facing as the case may be, including the cuttings.

Deductions in Brickwork for Stonework.

Deduct from the brickwork all that portion of stone bedded in the walls where the stone is not less than 6 in. in height, and keep that behind the stonework separate, as in "backing," as described in "Bricklayer."

Facings to be deducted the sizes of the face of the stone in this case. Describe the facings as "including cutting and fitting to stone dressings," as there will be numerous "straight joints" in the facing next the stonework. Some surveyors measure an item of this at *per foot run*. In the case of cutting and fitting to moulded work, girt the moulding, and if more than 12 in. girt, bill at *per foot run*; if less, *number* these, mentioning the girt.

Yorkshire and other similar Stones.

Pavings, per foot superficial.—Give thickness and finish, and describe how bedded and jointed, and include with the item jointed edges.

Landings, per foot superficial.—Give thickness, describing the faces whether tooled, rubbed, or self-faced.

Corbellings, per foot superficial.—As described to landings.

Template Courses, per foot superficial.—If over 9 in. If under this width, *per foot run*.

Edges to the foregoing, per foot run.—To the back edge of a landing next a tile or wood floor take a labour of "back joint."

Take "tooled" or "rubbed" edges, stating the thickness of the stone. If moulded, give the girt of moulding.

If any edges of the stone are sunk back from the right angle, take as "sunk," stating whether "rough," "tooled," or "rubbed," as the case may be.

If any edges are notched, take a preliminary item of "rough sunk edge," and describe the finishing labour as "stopped," and number the mitres to moulding.

Grooves, throats, &c., per foot run.—Keep "stopped" separate, and also "circular."

Steps, per foot run.—State sizes and full description of labour, giving the number of faces rubbed or tooled, and stating when spandrel, and include splays and back joints

with the item. *Note.* If spandril steps have square wall ends, it is better to *number* the steps complete, including the ends.

Treads and risers, per foot run.—Give particulars, as last described.

Window sills, per foot run.—Give size and full description, include weatherings and throats and any other labour with the item, and state if tooled or rubbed.

Curbs and Copings, per foot run.—State sizes and full description, and include the joints. Take angles "extra" where rebated, rounded, or chamfered, as this includes working the "stop," and the extra labour working up to the stop.

Scantling lengths.—Where any stone is over 6 ft. in length, keep separate as in *Scantling length*, and if much in excess, give the length.

In landings, when over 6 ft. in length either one or both ways, give both dimensions of the stones.

The following items should be "numbered."—Jointed ends to steps. If a step or sill is in more than one stone take two jointed ends at each joint, unless the joints are plugged, when number complete as "plugged joint." Fair ends to steps, stating if rubbed or tooled. If the joint is not at right angles with the face described as "sunk joint." Ends to sills including the stools for jambs and stoppings to throats.

Ends, mitres, &c., to copings. Mortices for dowels. Perforations for coal plates, &c. All ends of ironwork, &c., let in, and leaded, or cemented, or run with sulphur Cramps in copings, &c. (including the cramps and the mortices and cement, or running with lead).

Templates and corbels; giving sizes and thickness, and if tooled or self-faced, also noting the finish of the exposed edges.

Chimney-pieces.—Plain stone chimney-pieces are often numbered, giving the size of the openings and the sizes and finish of jambs, mantels, and shelf, and include the fixing and the cramps necessary for same.

Ornamental chimney-pieces are usually billed at a p.c. price, or a provisional amount put in the bill. Describe whether this amount includes package, carriage, and fixing with the materials for same.

CHAPTER VII.

MODES OF MEASUREMENT.—*Continued.*

SLATE MASONS', SLATERS', AND TILERS' WORK.

Slate Mason.

Slate Shelving, Lavatory Tops and Slabs, &c., per foot superficial.—Mention the kind of slate and state thickness and finish, whether "sawn," "planed," or "rubbed" one or both sides. Any lengths over 6 ft. to be kept separate, as in "*Scantling.*"

Labour on the foregoing, per foot run.—Edges "sawn" "planed," or "rubbed," or rounded or moulded, stating thickness of slate. Rebated joint, including oil cement (if any). Splay cuttings and notchings over 12 in. girth. *Numbers*—Rounded corners, giving the girth. Small splays and notches. Perforation for taps and basins (in the latter case giving size and if rebated or rounded). Sinkings for soap, &c., and any small labour, stating in each case where necessary the thickness of slate, and, to fair work, the finish.

Skirtings, per foot run.—Give height and thickness, also finish, and include with the item the fixing, also screws (where necessary) and holes and plugs. *Number* ends, mitres, &c.

Channels, per foot run. — Give size and girt of the channel and state if to falls. *Number* stopped ends, holes for gratings, pipes, &c.

Number the following items, including labour and materials.—Cantilevers for shelves, giving full description, size, and length, and if shaped, give sketch in margin of bill. Grating rims, giving size and thickness, and size of perforations; also small shaped lavatory tops, including all the labours.

Enamelled slate.—If the slate is enamelled, incorporate with the foregoing descriptions, and, if imitating marbles, state kind imitated.

Chimney-pieces.—*Number* these as described for stone.

Slater.

Ordinary slating per square superficial (100 *ft.*).—State size (*i.e.*, Duchess, Countess, &c.), quality, and description of slates, also the lap and how fastened (*i.e.*, number of nails to each slate and the description of nails) and also whether torched or rendered on underside. *Note.* That in measuring the surface of a roof, if all the slopes are similar, measure the extreme lengths of eaves; as the hips and valleys, with the exception of allowance for cutting, do not affect the superficial measurement.

Example: Fig. 8. Although this on plan is so much cut

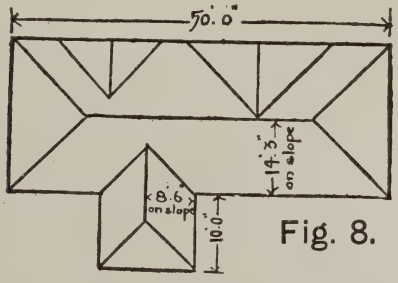


Fig. 8.

up, the surface can be measured (without the allowance for cuttings) in two dimensions.

2 /	50.0		
	14.3	1,425—0	Slating (according to description).
2 /			
	10.0		
	8.6	170—0	

Allowances for Cuttings.—Add to the superficial quantity of slating the lengths of the following items by the widths specified as allowances for waste in cuttings, &c.:—*Eaves* (for the double course): Half the length of slate + 1 in. (above nail holes), *e.g.*, for Countess slating $\frac{1}{2}/1.8 = 10$ in. + 1 in. = 11 in., the width by which the dimension is squared. *Hips and Valleys:* 6 in. on each side. *Cuttings around Skylights, Dormers, and Chimneys:* 6 in. down each side.

Note. The allowance for eaves to be made at the top of these.—*Raking Cuttings:* 6 in. in addition to any other allowances previously described. *Note.* No allowance is made for cutting next ridge nor at the *ends* of a roof next a gable when at right angles.

Slating to Mansards, &c.—Keep this separate from remainder; also that to vertical sides of dormers, &c., describing the latter as in "small quantities to sides of dormers." Sometimes at the eaves the slating is formed to a curve or "bell cast," in which case keep this separate, or take an "extra labour," and if, as is frequently the case, some portion is at a very flat pitch, it will be necessary to bed the slates in oil cement, or putty. If this is so, incorporate this with the description of the "extra" item.

Slating to Conical Roofs.—Keep separate and describe as to "conical roofs," giving the radius at eaves.

Ornamental Slating.—If the whole of the roof, describe with the item if in bands or panels, either in cut slates or slates of a different description, measure this portion as an "extra" over the general description.

Westmoreland Slating.—The system of measuring slating described does not apply to *Westmoreland slating*, which is laid in diminishing courses from eaves to ridge, which fact, as well as a full description of the slates, &c., should be stated.

The allowances for cuttings, &c., to *Westmoreland slating* generally accepted are as follows:—*Eaves* by 1 ft. 6 in.; *hips and valleys* by 9 in. for each side; *dormers, chimneys, &c.*, by 9 in. down each side in addition to the allowance for eaves at top; *verges and ends of roof next gables* by 3 in.

Measure the following Items at per foot run.—Hip and ridge rolls, giving the diameter of rolls and the width and thickness of wings, and state how fixed. The cuttings at feet, to slope of roof, at intersections of ridge and hips, and mitres to be *numbered.* Fair cut and mitred hips, stating if bedded in oil cement. Fair verges, stating if bedded on brickwork or with cement fillet under.

Numbered Items.—Holes through roofs for pipes, giving size of pipes, also any cutting and fitting around stay bars for pipes, &c. Hip hooks, if ornamental, give a sketch in margin of bill.

Stone Healing, per square superficial.—Measure as for slating, but take extra for eaves, and cuttings at hips, valleys, &c., *per foot run*, including waste.

Tiler.

Roof Tiling, per square superficial.—Give description of tiles, also the lap or gauge (length of tile showing) whether nibbed, pegged, or nailed, if the latter the number and description of nails.

Weather Tiling, per square superficial.—As described to roof tiling and stating whether nailed to joints of brickwork or to battening or boarding.

Ornamental Tiling.—If any of the tiles are ornamental, state proportion, or, if in bands or panels, measure this as an "extra" over the general description.

Tiling for Conical Roofs, as described to slating to conical roofs, stating if tiles are to be *curved* or merely shaped.

Allowances for Cuttings.—Add to the superficial quantity of tiling the lengths of the following items by the widths specified as allowances for wastes in cuttings, &c. *Eaves* (for the double course) : 6 in. Occasionally the item is measured at per foot run as "extra for double course at eaves." *Hips and Valleys* : 6 in. on each side. *Cuttings around Chimneys, Skylights, and Dormers* : 3 in. down each side. *Note.* The allowance for eaves to be made at the top of these. *Raking Cutting :* 6 in. in addition to any other allowances previously described.

Measure the following items at per foot run : Ridge tiles, giving full description, or the p.c. of tiles, or, if selected from a catalogue, give the catalogue number, and state how fixed. Cuttings to slope of roof, and mitres, &c., to be numbered. Hip and valley tiles : Measure these as "extra," and if to varied pitches state this, and also the number of variations, as the tiles frequently have to be purpose-made. Extra to tile and half at verge. Pointing to verges and eaves.

Numbered Items.—Holes through roofs for pipes, hip-knobs, and finials ; state p.c. or give catalogue number. Also any cutting and fitting in tiling around stay-bars for pipes, &c., and around end of sills.

CHAPTER VIII.

MODES OF MEASUREMENT.—*Continued.*

CARPENTERS' WORK.

THERE is one point to be observed in the measurement of carpenters' work, and that is, that in measuring the lengths, every allowance must be made for the extra length required for the tenons and scarfings in constructional work. This is a matter of some moment, as in the case of large timbers this amounts to a considerable proportion of the whole. The proportions for scarfings generally may be considered to be three times the depth of the timber in every 20 ft. length. Thus for a 9 in. by 4 in. purlin the allowance would be 2 ft. 3 in. Some surveyors number the extra labour involved in this, and if there is any special wedging or cutting it is advisable to do this, but in the event of small timbers, which are merely halved, it is hardly necessary, as the term framed will probably cover any such labour, the proportion of "framing" in the event of lengths requiring scarfing being proportionately small for the total cube quantity of timber. The bolts required for scarfing should be measured separately as described in "Smith."

It is a general rule to bill the items of "Use and Waste," first. Therefore, the first items that appear in the Carpenter's bill are centering, horsing, &c.

Centering, &c.

Centering for concrete floors, per square superficial.—The system of measuring this item was fully described in Chapter III.

Centering to vaulting, per square superficial.—Take the surface of the soffit of the vaulting. Mitres and groin points are measured at *per foot run*, "including waste," as are also raking cuttings.

Centering to apertures, arches, &c., per foot superficial when not less than 9 in. wide on soffit, stating the shape, *i.e.*, whether flat, segmental, semicircular, elliptical, or otherwise. If less than 9 in. wide on soffit, measure at *per foot run. Note.* That if the soffit of an arch is in more than one plane a separate centre must be taken for each. Keep centering to gauged arches separate, as these require to be planed on the back on account of the finer finish of the soffit of the arch.

Turning pieces, per foot run.—Take these to flat or slightly curved arches when less than 9 in. wide on soffit.

Centering to trimmer arches, per foot superficial.—These are sometimes required to be left in. If so, state this. In this case it will not be necessary to take the item of "filleting soffits of trimmer arches" hereafter described, as the centre is fixed so that the underside may be lathed to carry the ceiling through under same.

Centres to Bulls' Eyes.—Number these, giving the diameter and the widths of soffits. This is sometimes done in the case of semicircular centres, some surveyors going so far as to number the whole of the centres.

Notches in Centering.—Number any notches required in centering for key blocks, &c.

Horsing and Strutting Stone Lintels.—Number these, giving the lengths, these lengths being "averaged" by the abstractor.

Constructional Work.

Fir in Plates, per foot cube.—6 in. to be allowed in every 20 ft. running length for laps. *Note.* That if the building is hipped, cross-ties and dragon pieces will be required at the angles.

Circular plates should be measured at *per foot run* stating the radius.

Fir in Lintels, per foot cube.—These are frequently billed with the plates, and the item then appears as "fir in plates and lintels."

Fir in Ground Joists and Sleepers, per foot cube.—These to be kept separate from the other joists.

Fir in Floors, per foot cube.—Describe this work as

"*framed*," and take the deductions and additions for trimmings, and include with the cube quantity, allowing in the lengths for the tenons, this being practically the whole of the "framing" required. Take here any iron, stone, or brick corbels required to carry ends of joists next flues. The ends of joists are built in, therefore an item of cutting and pinning is not required.

Fir in Partitions, per foot cube.—Describe this work as "framed," keeping that in *trussed* partitions separate. The inter-ties being in short pieces are frequently measured at *per foot run.*

Fir in Roofs, per foot cube.—Describe this work as framed, keeping that in *trusses* separate. It is also advisable to give an item of "Hoisting trusses," describing as "King post truss," "Queen post," &c., as the case may be, with the span and rise and the height they have to be raised. Allow for trimmings as described to floor joists.

General Note. — In addition to the allowances for "scarfings," previously mentioned, it must be borne in mind that if the lengths of rafters, joists, &c., are over 25 ft., allowances must be made for "passings." If, however, it is necessary for these to be in one length, the item must be kept separate and the length stated. This also applies in the case of timbers of any exceptional size.

Timbers less than 2 in. thick and over 4 in. wide to be measured at *per foot superficial*, but if less than 4 in. wide and $2\frac{1}{2}$ in. thick at *per foot run.* The latter are sometimes billed separately at per foot cube in "small scantlings," but the former method is preferable.

If timbers are to be of the sizes specified, *i.e.*, without any reduction in size for saw cuts and planing, this fact should be stated in the heading. This will also apply to the thicknesses of boarding.

Labours on Timbers.

Planing, per foot superficial.—This should be all measured and not included with the item of timber. The latter is a slipshod method sometimes adopted to save time and trouble, but gives the contractor very little idea as to the quantity of planing required.

Circular cutting, per foot superficial, if over 6 in. wide; if under, at *per foot run.* State whether "rough" or "wrot."

Splays and Chamfers, per foot superficial, if over 6 in. wide; if under, at *per foot run.*—State whether "rough" or "wrot." *Number* stops (those to the running items follow the item, the others "averaged" and following the superficial dimension). State whether splayed or moulded, and if the latter give a sketch if in any degree elaborate. The stops to include the extra labour working up to stop. Keep circular work separate, and state whether to "flat" or "quick" sweep.

Mouldings are measured as last described.

Sinkings.—Number these, giving size, shape, depth, and the finish around the edges, giving the widths or girts of the chamfer, or moulding to edges.

The following items are also to be billed as *numbers:* Cutting and shaping finial posts, and the neckings, caps, &c., to same. If the finials are small, number same complete with necking, caps, &c., giving sketch. Fixing bolts, straps, &c., averaging the lengths. Letting in and pelleting bolt-heads. Short wrot ends to timbers, giving sizes and lengths. If shaped, give sketch.

Coverings, &c.

Battening for Tiling, Slating, &c., per square superficial.—State size of battens and what it is for (to enable contractor to judge of spacing), and if for weather tiling keep separate, and state if plugged to brickwork.

Wall Battening, per square superficial.—State size of battens and the spacing, and if plugged to brickwork.

Roof Boarding, per square superficial.—State thickness and whether "rough" or "wrot."

Boarding for Lead or Zinc Flats, &c., per square superficial.—State thickness and describe as "traversed for lead." If with firrings include with the item, if of ordinary depth. If firrings are extra deep, as in the case of the upper end of a large flat, it is advisable to take these separate up to the *lower level* at drip, still describing the boarding as "including firrings." Dormer tops and other small items

are measured at *per foot superficial*, and described as "in dormer tops."

Boarding to Cheeks of Dormers, &c., per foot superficial.—If for lead describe as "traversed for lead," and if in spandrils measure these net, stating this in the item. If very small these may be *numbered* including the quarterings.

Weather Boarding, per square superficial.—State *average* thickness, or mention the thickness of *both* edges and the lap, and describe as "measured net as seen."

Cuttings, &c., on foregoing Battening and Boarding.—For all raking ruttings and to hips, valleys, &c., allow the length of the cutting by 3 in. on each side, and add to the bulk of the boarding, &c., and describe as including all cutting, or take an item *per foot run* of "Raking cutting and waste." Take splayed edges to boarding at *per foot run*. Keep *circular battening and boarding* separate from the remainder, stating the radius, if to conical roof the radius at eaves.

Valley and Lier Boards, per foot superficial.—If the roofs are battened for tiling and slating, valley and lear boards will be necessary for lead valleys, and the turn-ups of lead from gutters. State thickness, and include the splayed edges and *deduct* the surface from the battening.

Gutter Boards, per foot superficial if over 6 in. wide; if under this width, *per foot run*. State thickness of boards and also whether the items include bearers, and if so, the size, and whether these are framed.

Gutter Sides, per foot superficial if over 4 in. wide; if under this width, at *per foot run*. State thickness, and if edge cut to slope of gutter.

Felting to Roofs, per square superficial.—Give full description, how nailed, and the width of laps; measure this *as seen*, and describe the item as such, the builder making his allowance for laps. It is usual to allow the same for raking cutting and waste as described to boarding, &c.

Grooves, Rebates, &c., per foot run.—If over 2 in. girt, state the girt, and also if "stopped."

Fixing Pieces, per foot run—Measure these the width of jambs for fixing joiners' work. These are frequently *numbered*, giving the sizes

Tilting Fillets, per foot run.—No size need be given for these unless exceptionally large.

Eaves Boards, per foot run.—State thickness, and if feather-edged state this also, and also if "wrot."

Feather-edged Springing Pieces, per foot run.—These to be taken on the side of trimmer joists as skewbacks for trimmer arches.

Secret Gutters.—It is not often necessary to measure this as a separate item, unless the roof is battened only. Even in this case an extra rafter and a tilting fillet will generally cover everything for this.

Drips, per foot run, unless in gutters less than 12 in. wide; in the latter case, they should be *numbered* as "short drips in gutters." The depth should be stated and also whether rebated, cross-rebated, or rounded.

Rolls, per foot run.—State size and whether for lead or zinc; if the former they must be rounded, and if the latter double splayed. State if "bird's-mouthed to hips" or ridges. *Number* mitres, stating, if more than an ordinary mitre, whether "3-way" or "4-way," or otherwise as the case may be, also any short lengths in gutters.

Eaves Fascias, per foot run.—State thickness and describe whether rough or wrot, and include with the item mouldings, splays, grooves, &c. *Number* mitres, &c.

Eaves Soffits, per foot run.—Measure as last described. If over 6 in. wide this item can be measured at *per foot superficial*, taking the labours separately.

Herring-bone Strutting, per foot run.—Measure the extreme length, including the joists, state size of strutting, and the depth of joists, and describe as "double." If *solid strutting* is required state thickness of strutting and the depths of the joists.

The following items should be billed as numbers.—Gusset pieces to gutters, stating size. Cesspools, stating size and depth, and, if extra over gutters, mention this in item. Short sprocket pieces, state size and length, and, if cut, the character of the cutting (a sketch is frequently advisable with this item). Felt pads to rolled joists. Filleting soffits of trimmer arches for lathing to, &c. Also any small labours to notchings, cuttings, scribings, &c.

Half Timber Work, Gables, Finishing to Dormers, &c.

Half Timber Work.—Although this work is frequently in large timbers, it is advisable to measure this at *per foot run*, including with the items the labour to faces and edges, such as grooves, &c., and describe as "framed," and, if pinned, state this also, and if pins left projecting. If "sham" half timber work, describe whether plugged to brickwork or fixed to studding, and how fixed. *Circular and shaped* pieces are frequently better *numbered*, giving the full sizes and description of labour, &c.

Beams in Half Timber Work, per foot run.—Measure these, including the ordinary labour to moulding, &c., but, if *cambered*, measure the labour to cutting to camber separately, and also the moulding, &c., on cambered edge.

Barge Boards, per foot run, including all labours to moulding, &c. Take any "planted" mouldings separate. *Number* mitres, &c., and returned ends at feet, and if shaped or made out to curve, give sketch. State how barge boards fixed, *number* housed ends of timbers to same, and measure bolts (if any) as described in "Smith."

Cornices, per foot run.—State size and girt of moulding. If "sprung," state this, and give width (on slope) and the thickness of material the cornice is cut from, and also the girt of moulding and the edges, if splayed, grooved, &c., and also state if the item includes blockings. *Number* mitres, ends, &c.

Dentils, per foot run.—State if worked on solid or planted on, and give size (three dimensions) and distance apart, state if in undercut moulding, and if dentils themselves are moulded. A sketch is frequently necessary in this item.

Brackets, Corbels, &c. — *Number* these, giving full description, sizes of timber, &c., the labour, girt of mouldings, &c., and how fixed.

Carving.—The same remarks apply to this as to "Carving in Stone."

External carpenters' work is frequently put together in white lead. If this is the case incorporate with the heading, and also state whether secret fixed, and if copper or brass

screws are to be used. It is generally advisable to keep all external finishings under a separate heading, giving these particulars and any others that may be necessary to enable the contractor to arrive at a fair idea as to the quantity of the labour involved. Some surveyors put these items in the joiners' bill, and it is sometimes somewhat difficult to draw an exact distinction, but this is of little moment providing the descriptions are thoroughly self-explanatory.

CHAPTER IX.

Modes of Measurement.—*Continued.*

JOINERS' WORK.

The measurement of Joiners' work, with perhaps the single exception of Masons' work, demands a more intimate acquaintance with the methods of preparation and construction, than any other portion of building work, although the methods of measurement are extremely simple. One fact should be distinctly stated, and that is whether the dimensions and thicknesses of the work are *net* when finished, or whether subject to an allowance for waste. Some architects specify that $\frac{1}{16}$th of an inch will be allowed off the thickness for each wrot surface, and this is, perhaps, the best system, as it is frequently found when measuring joiners' work, that, while the thickness is slightly over a certain definite dimension, it is not sufficient to allow another $\frac{1}{4}$ in., a $\frac{1}{4}$ in. being considered the smallest variation in thickness necessary to take note of. If, therefore, some such note is made, the surveyor will be able to take a distinct and unassailable position when noting the thicknesses and sizes of the work he is measuring.

The joiners' bill being generally the longest of the series, it is usual to subdivide the items under headings to a larger extent than in the other trades, in order the more easily to find individual items in the bill.

The items in deal appear first in the bill, subdivided under the headings of "Floors," "Skirtings," "Doors," "Windows," &c. The items in hard wood follow under their respective headings in the same way, the rough rule being to bill the woods in the order of their respective values, commencing with the cheapest.

This subdivision will be followed in this chapter, which, while following the general method, is, of course, open to variation according to the individual taste of the surveyor.

Floors.

Boarded Floors, per square superficial.—Give description of boards, stating thickness, whether wrot or rough, widths of boards, description of joints, whether "folding," "straight joint," "rebated and filleted," "grooved and tongued with loose tongues" (state whether wood or iron), "grooved and tongued on solid," or other description, and whether secret nailed; also the kind of heading joints in the lengths of the boards, and if to be cleaned off at completion. Measure flooring net, deducting chimney-breasts and hearths. Take raking and circular cutting and waste at *per foot run*, also mitred borders to hearths, stating width and thickness. *Number* cutting and fitting to small circular corners, and around columns, &c.

Block Floors, per yard superficial.—There being so many different patents for this, each one having its admirers, it is frequently specified at a p.c. price. The manufacturers generally claim an addition to the net superficial measure of the girth of the room of 3 in. as an allowance for waste. If this addition is not measured, it is well to make a note to the effect that the quantity "includes all straight cutting and waste." In any case measure raking, cutting, and waste at *per foot run*.

It will generally be found that the cement bed has to be provided by the builders, and also plugs or blocks in the concrete for fixing the borders.

If no p.c. price is given, state size of blocks, with the labour to edges of same, and the pattern when laid, and whether bedded in tar, &c.

Parquet Floors, per foot superficial.—Generally at a p.c. price laid complete. *Note* that a counter floor has to be taken for this in addition.

Skirtings, Chair Rails, &c.

Skirtings, per foot run, giving full description. If the moulding is in any way elaborate state girt; and if double-faced mention the size of each portion. *Note* that a double-faced skirting, if both members are moulded, is "double faced and *double* moulded." Include the grounds

and backings with the descriptions, keeping those plugged to brickwork separate, or number fixing blocks. *Number* mitres (external and internal), housings, scribings, returned ends, &c. Where a skirting is tongued to the floor, describe this with the item, and take a length of "groove in floor, part cross grain (done in position)."

Chair Rails, &c., per foot run.—The rules for measuring skirtings may be generally followed for dado rails, picture rails, and similar work.

Doors and Framings, &c.

Doors, per foot superficial.—State thickness and number of panels and give description whether "square," "moulded," "bolection moulded," "bead flush," "bead butt," &c., one or both sides, and if panels raised and mitred, and if moulded on raising. State also whether mouldings are stuck on solid. If any unusual arrangement of panels, give sketch. It is advisable to take separately any planted or face mouldings (except to panels) at *per foot run*, including the grooves (if any), with the items, stating if the grooves are "stopped." *Number* returned ends, &c., to these mouldings. *Note* that in measuring folding doors, the width of the fold (generally taken as an inch) is added to the width of the doors, the rebates being included with the doors, and taking at *per foot run* any mouldings, &c., at meeting. If any panels are open for glass, incorporate in the description, stating if stiles diminished, and if sashed mention number of squares, and if bars are of unusual width or description give size and description. Measure at *per foot run* the beads or mouldings around glass, stating if bradded or fixed with brass screws and cups.

Framings, per foot superficial.—State thickness, number of panels in height, and, if panels are of exceptional size, mention this, and describe as above noted for doors. If any portion of the framing is irregular in shape measure this net and describe the shape, and also mention the fact that it is "measured net." Doors in framings are frequently *numbered* as "Extra over framing," giving the size, number of panels, &c. Measure the rebates, beads, stops, &c., at *per foot run.*

Windows, &c.

Sashes and Frames, per foot superficial.—Give thicknesses and full description of parts of boxings, and how put together, also sizes and descriptions of sills, the thickness of sashes, and whether square, chamfered, or moulded, and if the latter, description of moulding. How sashes are divided, *i.e.*, whether in one square each, small squares, or otherwise; and if bars of exceptional width, state this. Describe whether single or double hung, the kind of lines, axle pulleys, and weights. *Note.* If glazed with plate glass, lead weights will be required.

If sashes are in more than one light—*i.e.*, have mullions—keep these separate, stating the number of lights; give a description of the mullions, whether solid or cased, and the number of lights hung, and how. If, as is sometimes the case, the sashes and frames have a transom, measure this at *per foot run* as an extra over sashes and frames, and if fanlights above are hung *number* these, averaging the sizes. The *angle* mullions to a bay window should also be measured as an "extra."

In taking the dimension, unless the frames show externally, allow 9 in. in the width, and 3 in. in the height, beyond the size of the external opening.

If windows have shaped heads, measure them square, and keep separate, describing the shape.

At the end of each item should be stated the number of frames contained in the dimension, to enable the contractor to judge of the average size, as "(in No.)."

Splayed edges to sashes and splayed meetings should be included with the item, but, should there be any exceptionable labour here, measure separately at *per foot run.*

Casements and Frames.—Some surveyors measure these complete at *per foot superficial,* including casements, frames, and sills, and this system answers very well in the case of very ordinary windows, say, to cottages, &c., but where the work is of a better class and rather more elaborate description it is a far better plan to take the work out in detail. In fact, where there is any great variety, it will be found in the long run a saving of time, besides giving a much better idea

of the work involved. The trouble of writing fresh descriptions, or, if a variation only on description, the difficulty of keeping each quite distinct is avoided by this system, and in the case of works of any extent the variety is interminable. In following the latter system, measure sills, frames, mullions, and transoms at *per foot run*, including all the labours, and the casements at *per foot superficial*, describing the thickness, and if chamfered or moulded; if the latter, the description of moulding; whether hung or fixed, the number of squares, and how divided, as described in "Sashes and Frames," and also noting the number of casements with each item, as "(in No.)."

If casements have shaped heads, measure these square and keep separate, describing the shapes.

Bull's-eye casements are frequently *numbered*, and this is probably the better plan, and if very small, include the frames with the item.

Circular frames will require keys and wedges taken to the joints as *numbers*.

The heads and sills are usually measured 9 in. longer than the width of external openings, and the jambs 3 in. higher than the height of same.

If casements are hung on centres, take sets of cut beads *both sides* averaging the lengths and billings as *numbers*.

Any labours to casements, beyond a splayed bottom rail, should be measured separately at *per foot run*.

Fanlights and Borrowed Lights, per foot superficial.—These are usually billed under the heading of windows, and the rules for measuring casements will apply generally to these.

Door and Window Finishings.

By these are meant generally all the work in connexion with doors and windows, such as frames, linings, window backs, window boards, shutters, grounds, architraves, &c.

Linings, per foot superficial if over 4 in. wide; if under, at *per foot run*. State if rebated one or both edges or tongued, and include the backings. If linings are panelled, state the number of panels to each set and whether moulded or square or otherwise. If panels are shaped, it is advisable

to take this as an "extra" item as a *number*. Where linings are tongued to frames, take a groove at *per foot run*, except in the case of a solid frame measured separately, when the groove will be included in the description.

In good work the ends of linings are tongued to the window board. *Number* these, giving the lengths as an average, and include the groove with the item.

Splayed jamb linings will require an item of splayed edge at *per foot run*.

Frames, &c., per foot run, giving sizes and full descriptions of the labours.

Window Backs, per foot superficial.—Give thickness, and, if panelled, description of panelling as described for "doors and framings," and include the backings. Take housing at ends at *per foot run* if linings run down to floor. *Note* that skirting fixed to a window back is wrot both sides, and described as "plinth planted on."

Window Boards, per foot superficial if over 4 in. wide; if under, at *per foot run*. State thickness and finish of front edge—*i.e.*, rounded, moulded, &c., and whether tongued to sill. For the latter, take at *per foot run* an item of "groove in oak, teak, or deal sill," as the case may be, unless the sill is measured separately, in which case include with the item; include the bearers with the window boards. Take bed moulds at *per foot run*, stating whether tongued to window boards; if so, include the groove. *Number* splayed ends, notched returned ends, notches, mitres, rounded corners, and any other labours on the window-boards and bed-moulds. *Note.*—If the bed-mould is a deep one, a ground will be required, unless on a window back. If window-boards are under 4 in. wide they are generally described as "nosings." *Note.* Take window-boards long enough, and of sufficient projection to stop the architraves, and to cover the bed-moulds.

Sliding shutters, per foot superficial, stating thickness and description of panelling. *Number* lines and weights, including the axle pulleys, giving full description, and take at *per foot run* the boxing, giving full description, and sizes and thicknesses of the various portions.

Folding shutters, per foot superficial, unless in narrow

widths (*i.e.* under 9 in.) in which case measure at *per foot run.* Give thickness, and if panelled state whether moulded, square, or otherwise, keeping the back flaps separate. If measured at per foot superficial take the rebates, &c., at *per foot run*, but if shutters, &c., are measured at per foot run include same with the item. Measure shutter backs at *per foot superficial*, describing whether panelled or plain and include the backings, &c. *Number* elbow caps, soffit linings, &c., stating size and thickness and describing the shape.

Grounds, *per foot superficial*, if merely splayed and over 4 in. wide; if under this width, or if moulded, or double-faced, or in any degree elaborated, it is advisable to measure at *per foot run.* Describe grounds to doors and windows as "framed." Keep *circular* grounds separate, describing whether on plan or elevation and giving the radius.

Architraves, *per foot run*, stating size and full description; if of special moulding to detail, give sketch if difficult to describe; if of stock pattern state this. Include mitres with the item unless exceptional, and keep *circular* architraves separate as described to grounds. *Number* plinth blocks, giving size and shape, and take architraves long enough to allow for framing to plinth blocks, and include this in description of the latter.

General Note.—Allow on length of frames, linings, grounds, architraves, &c., for crossings at angles.

In deal work if any of the plain items are over 9 in. wide, describe these as "cross-tongued" and keep separate from the remainder. This will apply to all deal joiners' work throughout.

CHAPTER X.

MODES OF MEASUREMENT.—*Continued.*

JOINERS' WORK.—*Continued.*

Wall and Ceiling Linings.

WALL BOARDING, *per square superficial.*—State thickness, widths of boards, description of joint, as "matched and beaded," "matched and V-jointed," or otherwise. If the joint is moulded give a sketch. Include with the description the backings, keeping that plugged to wall separate from that on partitions, or take fixing blocks as *numbers.* Measure the boarding *net*, taking "raking cutting and waste," and "circular cutting and waste" at *per foot run.*

If the boarding is in short lengths to a dado keep this separate, describing as "in dado."

Ceiling Boarding, per square superficial.—Describe as noted for wall boarding, but if on wood joists no backings will be required, but if on concrete ceiling, backings plugged to the concrete will be necessary. Keep boarding to soffits of stairs separate, again separating that to soffit of winders from the remainder. As boarding to soffits of stairs is generally in somewhat short lengths and small quantities, it is sometimes billed at *per foot superficial.* Keep boarding in casing to beams separate, describing as such, and billing at *per foot superficial.*

Angles, &c., in Boarding, per foot run.—State if tongued and to the external angles whether moulded or staff-beaded. Measure also at per foot run any scribing to irregular face, housing, &c. *Number* small notchings, also scribings over skirtings, &c, stating whether scribings are over moulded work, and giving the size of the skirting.

Cornices, per foot run.—Give extreme size, girt of moulding, and any other description, and if built up, describe as noted in Chapter VIII. *Note.* That for each external

angle must be added *twice* the projection in addition to the net girt of the room. *Number* mitres, ends, &c., as before described.

Panelled Wall Linings and Dadoes, per foot superficial.—State thickness and description of panelling as described for doors, mentioning the number of panels in height. Include backings, with the description, keeping that plugged to wall separate, or take fixing blocks as *numbers*. Keep work circular on plan separate, stating the radius. It is sometimes advisable in the case of narrow dadoes, where the panelling is somewhat exceptional in arrangement, to bill these at *per foot run*, giving the height and full description.

Angles, &c., per foot run as described to similar items in boarding.

Plinths, per foot run.—Where a skirting is fixed on the face of boarding it is wrot both sides, and is then described as a "plinth." Measure this as described for skirting, except, of course, in this case grounds and backings will not be necessary.

Wall panelling and panelled dadoes do not always run down to the floor; in this case the lower edge of panelling is either tongued to the top of the skirting or the skirting is rebated for same. In the former case describe the skirting as grooved and take an item of rebate at *per foot run* to lower edge of panelling. In the latter case describe skirting as rebated. The skirtings here will require grounds and backings as described previously. *Number* mitres, ends, &c., as previously described.

Cappings, &c., of Dadoes, per foot run.—State size, and how moulded, and girt of moulding. Include grounds, with description, or measure separately, and state if plugged, or take fixing blocks as *numbers*. State whether rebated for dado, or if dado tongued to same describe as grooved, and take an item of rebate as described for plinths. *Number* mitres, ends, &c., as described for skirtings. Mouldings planted on face of panelling are measured separately, as described to mouldings on doors, &c.

Pilasters, &c., per foot run.—State size and how fixed, measure separately flutes, giving the width and depth and stating if stopped, and *number* the stops, stating the shape.

It is sometimes advisable to number flutes, including the stops, averaging the lengths.

Plinths, cappings, neckings, &c., to pilasters are frequently better *numbered*, giving the size of the mouldings, the full widths on face and returns, the number of returns, and the mitres and ends to each, and state whether housed in or merely planted on.

Fittings and Sundries.

Cupboard fronts, per foot superficial.—Measure over the front, state thickness and description of frame, and also the doors, stating whether single hung or folding, and whether in two or more heights, also describe the panelling of the doors as previously noted under the heading of "Doors," and any other particulars.

Ends and Divisions, per foot superficial.—State thickness, and also whether plain or panelled; if the latter, the description of panelling.

Keep dwarf cupboard fronts separate from remainder, and describe as such.

If doors are hung to slide, it will be found necessary to measure the frame in detail, and also the doors, describing the latter as "sliding." Runners, parting beads, grooves, &c., will also have to be measured at *per foot run;* but, of course, the particular details will depend entirely upon the architect's intention in this case, and as these are sometimes of rather an elaborate description, it is well that this should be clearly understood.

Shelving, per foot superficial.—State thickness and if wrot one or both sides. Measure wall bearers at *per foot run*, giving size and description, and stating whether plugged. Measure ship lap joints at *per foot run*, and *number* notches, rounded corners, also brackets under shelves.

Movable shelves should be so described, and the movable bearers at ends *numbered*, the vertical bearers, such as "shark's tooth," &c., should be measured at *per foot run*.

Lattice shelving is measured at *per foot superficial*, giving the size of the laths, the distance apart, and the size and spacing of ledges. State whether rough or wrot.

Water-closet Fittings.—Take the girt of the seat and riser by the width, and bill at *per foot superficial*, giving thickness and full description, and include the bearers. Flaps and frames are also measured at *per foot superficial*, describing the flaps as "clamped," "mortice and mitre clamped," or otherwise. Any finish to the edge as rounding, moulding, &c., to be measured at *per foot run*, as are also thumb mouldings. In the latter case give the size, and if tongued on include the grooves. Skirtings to water-closet seats are measured as previously described. *Number* seat holes, and holes for handles, &c., stating if the latter are finished with bead or moulding around.

The foregoing description is, of course, for enclosed water-closets, but if for a pedestal closet, *number* the item complete, making it perfectly clear what is intended, as there is a very great variation, both in character and general detail in these.

Bath Fittings.—Measure the bath top net at *per foot superficial*, and state that the item is "measured net." Measure at *per foot run* the work to edges and *number* the rounded corners, &c. For the enclosure the rules for measuring framings, &c., in Chapter IX., generally will apply. Unless the bath has feet, it will be necessary to take an item of cradling as a *number*.

Sinks per foot superficial generally.—Keep the rim and bottom separate, and state how put together, *i.e.*, whether dovetailed or otherwise. Small draw-off sinks to irregular shapes are frequently *numbered* complete. Measure at *per foot run* the legs and bearers, describing as framed and chamfered, &c., as the case may be.

Enclosures to Sinks and Lavatories per foot superficial.—The notes as to measurement of cupboard fronts, &c., will generally apply to these.

Labours at per foot run.—Grooves, rebates, chamfers, moulded edges (in these keep "stopped" and "cross-grain" separate from the remainder, and in the case of chamfers and mouldings number the stops and give descriptions. Grooves and rebates if of exceptional size, and also chamfers and mouldings, should have the girt noted), housings, scribings, angles, stating the thickness of the material dealt

with, and in the case of angles note whether tongued and whether external or internal, and if the former, whether staff-beaded, moulded, or plain. *Note.* Scribing is not required to be taken next a *new* plain face, such as new plaster, as the work is supposed to be finished to a true face. Take plugging at the end of framing next a brick wall, whether plastered or not.

Pipe-casing, per foot run.—State thickness, and give full description, and include the grounds, stating if the latter are plugged, and if the casing is fixed with brass screws and cups, or otherwise.

Rails, &c., per foot run.—State width and thickness, and finish to edges, and how fixed. *Number* returned ends, mitres, &c.

Sundry items billed as numbers.—Notches, small scribings, attendances on water-closets, baths, lavatories, sinks, &c., brackets, draining boards (giving sizes and thicknesses and description of flutings and if stopped, and any other particulars), plate-racks (giving size), dressers (giving sizes and full description and dimensions and thicknesses of detailed portions throughout), and any items that cannot be measured. The surveyor must not, however, be tempted to *number* items to save himself trouble at the expense of the contractor having to take off his own quantities, for items that should appear in the bills in detail. It is sometimes advisable, however, where detailed measurements do not thoroughly explain the work involved, to *number* the item and to give the detailed dimensions underneath, kept short to enable the contractor to make up the total cost of this particular item before placing the amount in the general money column of the bill.

Staircases.

Treads and Risers, per foot superficial.—Allow beyond the sight width of the treads and risers 1 in. each end for housing, and take this dimension by the width of the tread, and the height of the riser, added together (making an additional allowance for the nosing). Give thickness of tread and riser, description of nosing, and state whether

risers are tongued one or both edges, and the number of carriages.

Winders and Risers, per foot superficial, to be measured net and so described in the bill. These are generally "cross-tongued," and should be described as such.

Landings, per foot superficial.—These are generally measured to include the framed bearers. Measure nosings to landings at *per foot run*, stating size and thickness, and, if tongued on, state this, and include the groove, keeping that cross grain separate from the other. *Number* mitres, housings, &c., to nosings.

Wall Strings, per foot run.—State size and thickness and whether moulded or otherwise. If the moulding is elaborate mention girt. State whether plugged to wall and if grooved or rebated for plaster or wall framing. Keep "ramped" and "wreathed" portions separate, *numbering* the heading joints. If ramps or wreaths are very short, *number* these, and describe as "extra." *Number* mitres, splayed ends, returned ends, heading joints with skirtings, &c.

Outer Strings, per foot run.—State size and thickness and the *labours* on the string. Take framed and housed ends as *numbers*, stating if "on rake" and the nature of the wood to which they are housed and framed; keep "ramped" and "wreathed" portions separate, or, if short, *number* as described for wall strings. Any cappings, face mouldings, &c., should be measured separately at *per foot run*, keeping "ramped" and "wreathed" portions separate, and *numbering* the ends, &c., as described to the strings.

Newels, per foot run.—Give size, and if merely chamfered or moulded at the angles include labours; *number* shaped caps and pendants, giving sketch if required. If turned, take the newel plain and *number* turnings to "waists," stating size and length of turning, and "caps" and "pendants." *Number* any sunk panels, flutings, moulded cappings, neckings, and any other works that cannot be measured, giving full dimensions and particulars. In the case of very elaborate newels, it is sometimes the better plan to *number* the item complete, giving a sketch.

Handrails, per foot run.—State size and if moulded or rounded. It is frequently necessary to give a sketch, or to

note the girt of the moulding. Keep "ramped" and "wreathed" portions separate, or if very short, *number* these and describe as "extra." *Number* mitres, newel caps, housings, and framings (stating if on rake), ends cut and wedged, &c., and take handrail screw at each joint.

Balusters.—These are generally better *numbered*, giving size and length, and stating whether "plain," "shaped," or "turned," with full description of the labour, and including the housings, keeping those to raking strings and handrails separate, and mentioning also the nature of the wood into which they are housed.

Sundry items as numbers.—Ends of treads and risers housed to strings (stating whether nosings are rounded or moulded), wide ends of winders and risers and narrow ends of ditto housed to strings, notches in treads, &c. to newels, bull-nosed or curtail ends and rounded corners (giving description of nosing, &c., and the girt of the ends or corners.)

The framing under stairs being in spandrel shape, is frequently kept under the heading of "Staircases."

Hard Woods.

The foregoing modes of measurement have been written as for "deal," but of course the same will apply to "hard woods." These should be kept under the same headings under the different woods as described in the early part of Chapter IX.

Ironmongery.

The Ironmonger's bill, being almost without exception a collection of *numbers*, very little description as to the method of taking ironmongery is needed. It is, however, a good plan to keep under various headings, *e.g.*, "Ironmongery and Fixing in Deal." "Ironmongery and Fixing in Hard Wood," "Brasswork and Fixing in Deal," and "Brasswork and Fixing in Hard Wood," the brasswork being fixed with brass screws. *Note* in the heading that the fixing includes screws.

As the quality and description of the items of ironmongery is so varied, it is absolutely necessary in most of the items to give the "p.c." or "l.p.," or the maker's name and number in the catalogue, and all other particulars necessary to leave no element of doubt as to what the items refer. It is advisable in the case of some of the items—some makes of weather bars, for instance—to obtain from the makers particulars as to the labours necessary to take for these items. This will apply to various special manufactures.

CHAPTER XI.

MODES OF MEASUREMENT.—*Continued.*

FOUNDER AND SMITHS' WORK.

Cast Iron.

RAIN-WATER PIPES, *per foot run.*—Give size, and state whether round, square or otherwise, and if of any special make, give the maker's name and number in catalogue, or p.c. or l.p. if possible; state if "heavy" make, how jointed, *i.e.*, whether simply in red lead, caulked in red lead and tow, or otherwise, whether ears cast on or ornamental loose bands, also if fixed projecting from face of wall with blocks, projecting plugs, or holder bats, and the kind of spikes, and also description of facing to which pipes are fixed, *i.e.*, brick, stone, or weather tiling. If the bands are ornamental, give maker's name and number in catalogue, or p.c. or l.p., and do the same with the holder bats. If of very elaborate or costly description, these had better be *numbered* separately. Measure rain-water pipes *net* and state this, and also that the quantity includes all short lengths. *Number* swan-necks, bends over string-courses, knees over plinths (stating projections in each case), shoes, bends, junctions, &c. (If of unusual shape, these should be described as "purpose made," and to include patterns.) Heads unless quite plain are usually billed at p.c. or l.p., or catalogue number and maker's name given.

Eaves Gutters, per foot run.—Give size and shape and, if possible, maker's name and number in catalogue. State how jointed—*i.e.*, whether clip, countersunk, or otherwise, and if bedded on brick or stone and screwed to fascia or fixed on brackets. In the latter case, give description of brackets and the distance apart and how fixed—*i.e.*, whether to rafters' feet, to fascia, or plugged to wall. If

brackets are of elaborate description, give sketch and description and keep separate as *numbers*.

Circular gutters must be kept separate, stating the radii and including the patterns.

Measure eaves gutters *net*, and state this, and also that the quantity includes all short lengths.

Number stopped ends, returned ends, outlets, angles (external and internal), keeping those other than right angles separate, and if not to an angle of 135 deg., take a pattern for each variation, stating that the angles are purpose made. Small breaks around pilasters and other similar items must also be *numbered* complete.

Railings, per foot run.—These are usually taken from a catalogue, and if so it is then merely necessary to give the number in catalogue and maker's name, or the p.c. or l.p., numbering gates and (if separately listed) the standards. The ends let in and leaded, and cut and pinned, are *numbered* and billed with the mason's or bricklayer's work as the case may be. In the event of loose cast-iron railing bars with wrought-iron rails being specified, the former are *numbered* with catalogue number and maker's name, or p.c. or l.p. given, and the wrought-iron rails measured at *per foot run* including the perforations.

If railings are to special design they must be fully described, with a sketch if necessary, and patterns taken.

Gratings.—If covering large areas, at *per foot superficial;* if in narrow widths and long lengths as to heating trenches, at *per foot run;* and if small, *numbered.* In either case give catalogue number and maker's name, or p.c. or l.p., at per foot superficial, per foot run, or each, as the case may be, but if no maker is specified then a full description with the thickness and the weight if possible, and take patterns.

Ventilators.—*Number* these, giving sizes and full description, or give catalogue number and maker's name, or p.c. or l.p. It is well in taking these to inquire whether anything has to be provided by the builder, such as lines, weights, &c. Also, in the case of roof ventilators, whether a wood base is required, or any other incidental work.

Stoves, &c.—*Number* these, giving width of opening, catalogue number and maker's name, or p.c. or l.p. These

are frequently put in at a provisional sum. In this case make it perfectly clear whether this sum includes package and carriage, *i.e.*, whether the builder is to add this to the amount of the provision. In the latter case mention where the price is, and also state the number of stoves included in this provisional amount, to enable the builder to make a proper allowance for carriage.

Number all sundry items, such as coal plates, shelf brackets, &c., giving full descriptions and sizes, or the catalogue numbers, &c., as previously described.

Wrought Iron.

Chimney bars, per cwt.—Measure these at per foot run and afterwards weight out (on the abstract). Allow in the lengths for the ends built in.

Gratings, per cwt.—Measure the bars and frame at per foot run, and afterwards weight out and describe as "framed." This will include all ordinary labour in making, but if any portion is made to open take this as an "extra" (giving the size of the opening portion, with any fittings required), and also any holes, &c., for pipes to pass through. It is advisable in the bill to state the sizes of the bars and frame.

Railings, per cwt.—If plain, follow generally the system noted for gratings, but take as "extra" any forgings to shape, pointed or forged heads, &c. If the railing is ornamental it is better billed at a p.c. sum *per foot run*, or, if this is not possible, give a sketch, with sizes of bars marked on and the height, and work out the weight per foot run, and state this in the bill.

Gates, if not given at a p.c., are frequently *numbered*, giving a sketch and the weight, with the locks, hinges, bolts, &c., taken separately.

The ends of railing let in and leaded, &c., are taken separately, as described to "Cast Iron" railing.

Balusters and Handrails, per cwt.—Measure these at per foot run, and afterwards weight out, keeping handrail (if rounded) separate, describe as "framed." This includes all ordinary labours. Take forgings to ramps, wreaths, mitres,

newel caps, &c., as "extras." Rounded handrails are frequently measured at *per foot run*, still describing as "framed," keeping ramped and wreathed portions separate if of considerable length, but if short, *number* these as "extra," as last described.

Bolts and Straps, per cwt., if more than 12 in. long. Measure at per foot run and afterwards weight out, keeping bolts and straps separate. Include with the bolts the weight of heads, nuts, and washers, and with the straps the holes for bolts. Add to the latter the weight of gibs and cottars to straps to king or queen posts, or *number* separately, giving the weight. *Number* as extra any ornamental washers and also any ornamental forging to straps. Bolts under 12 in. long and lewis bolts are *numbered* complete, giving diameter and length, and including the heads, nuts, and washers with the items. King and queen rods are measured at per foot run, and afterwards weighted as noted for bolts.

Number small items, such as plate corbels, &c., giving the size, or weight, and description.

Note.—The weights for bar iron (round, square, and rectangular), also bolt heads, &c., will be found in most books of reference.

Constructional Steel and Ironwork.

Rolled Joists, per cwt.—Measure at per foot run, and afterwards weight out. If much variation in size of joists keep each size separate, stating the number of joists, and the size, and the heights (either in floors, or the heights above ground) to which they are hoisted. If of exceptional length, entailing difficulty in "getting in" keep these also separate. State if cut to dead lengths, and, if so, the fact that they are "measured net."

Number holes for bolts, stating thickness of metal, and the sizes of the bolts, and whether punched or bored, and if the latter, whether "done in position." Number also forgings to shapes, giving full particulars, sizes of joists operated on, &c., and include the wood templates for these. Also connexions, stating whether flanges (one or both) are notched, and giving the sizes of angle-plates, the number

and sizes of bolts and holes to each, and if to anything but a right angle (horizontally or vertically) mention this also.

Riveted Girders, per cwt., keeping separate and giving in the bill the full description and lengths, and also the heights to which they are hoisted. If these are selected from a list it is of course merely a question of measuring the length at so many lbs. per foot run; but if specially designed they must be taken in detail, and the separate items weighted on the abstract and added together. An allowance of from 3 per cent. to 5 per cent. (according to proportion) is usually added for the rivets.

Connexions are *numbered* as described to rolled joists.

Roof Trusses, &c.—These are better billed under a separate heading as, "The following in No. (here follows full description of truss with the sizes of the various parts)," and measured and weighted in detail at per cwt. with the extra forgings, bolts, holes, connexions, &c., numbered. The general rules for measuring bolts, &c., previously noted will apply as to the mode of measurement.

Angle Purlins, &c., per cwt.—Measure these at per foot run, and afterwards weight out and *number* connexions, &c., including plates, bolts, and holes, giving sizes and descriptions. *Number* also cleats for purlins, giving description and the bolts and holes.

Flitch Plates, per cwt.—Measure at per foot superficial and afterwards weight out. *Number* holes for bolts, stating the sizes of the bolts.

Steel or Wrought-Iron Stanchions, per cwt.—The rules for measuring riveted girders will apply generally to these.

Cast-Iron Stanchions, per cwt.—The metal in these must be measured in detail at per foot superficial (for the shafts, caps, and bases, &c.) or per foot run (for featherings and such like), collected on the abstract, and afterwards weighted out and billed as "in No. (here give size, length, and description of stanchions, and the height to which they are hoisted)." Take a pattern to each variety, or if merely a slight alteration to pattern will answer the purpose, take as "Alteration to last pattern (stating what the alteration is)." Holes for bolts must be "rhymered out," *number* these, state the size of bolts and the thickness of metal.

Cast-Iron Columns, per cwt.—The rules for measuring cast-iron stanchions will apply generally to these. Take the *mean* girt of the shaft by the thickness of metal, and add cap and base plates, and also neckings, mouldings to caps and bases, &c., and include with the weight. Take patterns as described for stanchions, and also holes for bolts.

Note.—The weights for the various thicknesses of wrought and cast iron and steel will be found in most books of reference.

CHAPTER XII.

Modes of Measurement.—*Continued.*

PLUMBERS' WORK.

The work of the plumber so readily divides itself into two sections "External" and "Internal" that it is advisable to bill these separately, the external work coming first. The greater part of the lead used at the present time is "milled" both on account of cheapness and also from the fact that the sheets run in more even thickness, whilst cast lead, even with the best work, varies considerably. The latter is, however sometimes used in roofs of churches and similar cases, where a large surface is exposed, on account of the more agreeable colour. The description in the bill, both as regards material and labour, should distinctly state whether the work is in cast or milled lead, as in both labour and material the former is the more costly.

Architects in their specifications frequently omit to give the dimensions of the widths of lead and also the widths of turn-ups, &c. The dimensions hereafter given are those usually considered correct, but are, of course, subject to variation should the architect specify otherwise.

There is one point that the surveyor must always bear in mind, and with only $\frac{1}{8}$-in. scale drawings before him will in the majority of cases require his careful attention, and that is the width of the gutters. It will be frequently found that the widths shown on plan are insufficient, after allowing for the increasing width at the higher end, owing to the rise in the slope of the gutter and the drips, and the surveyor will find it necessary to set these out to a large scale in order to arrive at the correct average widths. As he is dealing with a somewhat expensive material, it behoves him to use care in doing this. This may appear a somewhat troublesome business, but with a little practice he will find that it will take little, if at all, longer to do this correctly than to do so in a slipshod manner, and in addition he will have the

satisfaction of feeling that, whatever arises, his dimensions will bear the closest investigation. The writer has endeavoured throughout these articles to impress upon the student the absolute necessity if he has any idea of becoming proficient in his work, of avoiding anything like a loose or slovenly way of doing it; and in no trade does this apply more than to the plumber. Moreover, in these days of hurry, the architect, however desirous of turning out a complete set of drawings, finds that he has to prepare these in as short a space of time as possible, and may occasionally overlook little points of detail. It is in these little matters that the surveyor, by conscientiously doing his work, can become the helpmeet of the architect by clearing up doubtful points in the early stages of the work rather than leaving them to be discovered at a later date, when they cause delay and trouble to all concerned, which could have been avoided had the discovery been made earlier.

Externally.

Gutters, Flats, and Flashings, &c., per cwt.—The lead for these is measured at per foot superficial and abstracted under the headings of the various weights: 5 lb., 6 lb., 7 lb., or otherwise, as the case may be, and afterwards weighted out and collected.

If the drips and rolls are not shown take the former not more than 10 ft. and the latter not more than 2 ft. 6 in. apart. The lead to flats and gutters next walls usually turns up 6 in., and up slope of roofs 9 in. from sole of gutter. Allow beyond the net width of the lead 7 in. for $1\frac{1}{2}$ in. and 9 in. for 2 in. rolls, and 6 in. for $1\frac{1}{2}$ in. and 8 in. for 2 in. drips.

Measure horizontal cover flashings 6 in. wide and stepped ditto (over soakers, &c.) 8 in. wide. Apron flashings 12 in. wide and stepped ditto 14 in. wide, valleys 21 in. wide. Keep lead in soakers and stepped flashings also secret gutters separate, or take an item for the latter of "extra labour" at *per foot run.*

Coverings to hip and ridge rolls are kept separate and should be measured 18 in. wide.

Work of a somewhat unusual character, as to small turrets, &c., should also be kept separate.

Allow beyond the net lengths of flashings, valleys, coverings to hip and ridge rolls, &c., 6 in. in every 10 ft. run, and also the same at each angle. This allowance will cover the lead required for the "tacks" as well as for "passings."

The ordinary labour to dressing over wood-rolls is included with the item, but the bossings at mitres, intersections, ends, &c., should be *numbered* separately.

Welted rolls—*i.e.*, without a wood core—should be measured as "labour" *at per foot run*, with the mitres, &c., *numbered* as last described.

The following items are also measured at *per foot run:* Dressings over mouldings (stating the girt), double welt, bedding edges of lead in white or red lead; copper nailing ("open" and "close.")

The following items are billed as *numbers:* Extra labour and solder to cesspools (if extra large, state size); mitres, &c., to mouldings (stating the girt); dressing lead around ends of sills; bossing and dressing lead around finials, crockets, &c. (giving full description and size; a sketch being frequently required); solder dots and screws; copper tacks; outlet pipes from cesspools (stating diameter, weight of lead, length, the number of bends, and including the solder joints and any other connexions and bands or tacks if necessary); gratings over cesspools; outlets of gutters and to tops of vent pipes (stating if galvanised iron or copper wire and the shape); lead rain-water heads (these are generally given at a p.c., but if not, a full description, with the thickness of lead and the size; in the latter case a sketch will generally be required).

Lead Rain Pipes, per foot run, as hereafter described to soil and ventilation pipes.

Internally.

In measuring internal plumbers' work the surveyor has to exercise his discretion as to the run of the pipes, &c., taking the shortest convenient run from point to point,

bearing in mind that while in the better parts of the premises they should be out of sight as much as possible they also should be easily accessible in the case of failure.

Lead Linings to Cisterns, Sinks, &c., per cwt.—Measure the lead for these at per foot superficial, and afterwards weight out as described for gutters, &c.

Measure at *per foot run* soldered angles, close copper nailing, and other similar items, and *number* bossed angles to safes, stating the height of the angles.

Lead Water Pipes, per foot run.—Give internal diameter and the weights per yard or per foot run. It is a good plan in the heading to the internal plumbers' bill to make an abstract of the weights of the pipes for the different sizes of "services," "wastes," and "overflow and ventilating pipes." It will then be merely necessary to mention in the item to what category they belong. Keep the pipes laid in trenches, and those fixed on walls separate, again separating the latter where they are fixed to glazed facing or tile wall lining, describing also whether fixed with wall hooks, lead tacks (in the latter case describe the tacks and the distance they are apart), or brass or copper bands. Include with all pipes up to $1\frac{1}{4}$ in. diameter the bends, but if over this size *number* these separately. Any pipes of 3 ft. and under in length, such as overflows to waste preventers, short lengths of wastes should be *numbered*, including the bends (stating how many in the length) and the joints.

Measure wrapping pipes with felt or other similar material at *per foot run.*

Solder Joints.—Number these, stating the size of the pipes. In the case of a smaller pipe being jointed to a larger one the plumber is entitled to the *average* diameter of the two pipes, but in practice it is not usual to mention less than a $\frac{1}{4}$ in. variation in size. Running joints in the length of the pipes (unless a variation in size) are included with the pipes. Where a lead pipe is jointed to a lead lining to a sink or cistern, describe the joint as "tafted." The soldered joints to cocks, &c., are usually included with the brasswork, unless a fitting such as a bath or lavatory is supplied with the cocks complete. In the latter case keep separate as "to brasswork, including tinning."

Stopped Ends.—Number these, stating the sizes of the pipes.

Joints to Earthenware.—Number these, giving the sizes of the pipes. These will generally require india-rubber cones; if so, include with the item. There are various patents now in existence, where a metallic preparation on the earthenware junction is used; in this case a solder joint is all that is necessary, and may be measured with the ordinary soldered joints.

Brasswork generally.—There is such an infinite variety in the brass fittings used by the plumber that the student would do well to study and thoroughly master the uses to which these various fittings are put to enable him to take the "right thing in the right place." These should, of course, be *numbered.* In addition to the great variety there is also a very great difference in the quality and cost, and therefore a very full description should be given, and, if possible, a list number and the maker's name. This applies with particular force to cocks and valves. In any case, they should be described as "including stamping by the water company." The solder joints to brasswork are included with the items as previously noted.

Cisterns.—Number these, stating size or the number of gallons they are to contain. If the space is confined, examine a maker's list to see whether a "stock size" will fit. If not, describe as "purpose made." Describe the thickness of the plates either B. W. G. or the thickness as "$\frac{1}{8}$ in. bare," "$\frac{1}{8}$ in. full," &c. If with angle around top or special frame or stay bars, &c., describe these also. Mention the height to which they are hoisted, and measure bearers, &c., separately. The holes in cisterns are usually included with the items of boiler screws and other brass connexions with the cisterns.

Connexion with Company's Main.—Number this giving the size of the connexion and including the screw ferrule and drilling, and tapping the main, and make the item cover any fees payable to the Water Company.

Baths, Number.—These are generally put in at a p.c. or l.p., and maker's name. Note whether the price given includes taps and other fittings, and whether a trap will be

required, or whether it is contained in the bath itself. If no p.c., is given, give full description and the size.

Lavatories, as noted for baths. Note whether the overflow requires a piece of lead pipe as connexion, also whether a top has to be taken. If so, take this as described in "Slate Mason."

Water-closets, as noted for baths. The waste-preventers are frequently included in the price complete. If a pedestal closet, see whether the price includes the seat; also the brackets for seat and waste-preventer. Describe whether fixed to wood floor or otherwise, and how brackets for seat and waste-preventer are fixed; whether plugged to ordinary brickwork, glazed facing, or through tile wall lining.

Lead Soil and Vent Pipes, per foot run, giving internal diameter and the weight of the lead "per foot superficial" as "equal to 7 lb." (or "8 lb.," or otherwise, as the case may be). Describe the method of fixing, and the facing to which it is fixed, also the kind of tacks, bands, &c., used in fixing, and the distance apart. If of very elaborate description, *number* these separately. If fixed in a chase, keep this separate, and describe as such. Short lengths as from the water-closets up to the main pipe are generally *numbered*, including with the item the number of bends and the joints. *Number* also beaded and perforated ends at top.

Iron Soil and Vent Pipes, per foot run, as described to drain pipes. *Note.* That in the event of the branch from the water-closet being lead, and the main pipe iron, a brass "slieve-piece" or "collar" will be required, as also at the connexion of a lead soil pipe with the drain.

It is a good plan to have a note in the heading of the bill that all work is to be done to the satisfaction of the water company, but the Surveyor should at the outset get a copy of the Regulations of the Water Company in whose district the work is situated to enable him to take his work correctly, both as regards weights of pipes and also the description of the fittings. He will also find a copy of the Regulations of the Local Sanitary Authority of great assistance to him where, as is sometimes the case, he has to use his discretion in selecting the various fittings.

CHAPTER XIII.

MODES OF MEASUREMENT.—*Continued.*

ZINC AND COPPER WORK. HOT-WATER WORK, ETC.

Zinc Work.

THE various thicknesses of zinc are denominated by "numbers," such as "12 gauge," "14 gauge," &c., but the matter is somewhat complicated by the fact that there are two distinct systems of numbering, the "English" and the "Vieille Montagne Zinc Company's," zinc manufactured by the last-mentioned company being generally considered the material for good work. It follows then that besides the number of the gauge the particular system of numbering must also be stated. In the event of "No. gauge Vieille Montagne zinc" being described, it will follow that the gauge is that of the "V.M. Company."

Another point to be mentioned—and this is the difference between the best and inferior work—is as to whether the work is to be executed "without solder." This allows for the expansion and contraction of the sheets, and thus prolongs the life of the work.

Zinc being made in sheets about 2 ft. 10 in. by 8 ft., the rolls are usually taken at about 2 ft. 8 in. centres, and the drips 7 ft. 6 in. apart, it being thus possible to get each bay out of one sheet without joints. The rule as to drips also follows in the gutters.

Flats, per foot superficial, stating the "gauge." It was formerly the practice to measure zinc work in the same manner as lead work, but owing doubtless to the fact that more attention has been given of late years to the laying of the former material, by which the work is of a much higher class than formerly, the following is the system usually

adopted:—Measure the full *width* of the flat, and after allowing for "turn ups" next walls, add the *extra* for turn ups next rolls; the *length* being measured as for lead work, but the allowances for drips being more numerous on account of their being a less distance apart.

The cappings to rolls are measured at *per foot run*, stating the girt of the zinc and including the clips.

The ends to rolls are *numbered* as "capped ends," and "saddle pieces," as are also mitres, stating if "solid," *i.e.*, out of one piece of zinc without solder, or "soldered," as the case may be.

Whereas in lead work it is usual to bill gutters, flats, and flashings together, in zinc work each item is kept separate.

Gutters, *per foot superficial*, stating the gauge measure generally as described for lead.

Flashings, *per foot run*, stating the gauge and the width and if "stepped." The bottom edge of zinc flashings are frequently "beaded" for strength. If this is so, mention with the description of the item.

Soakers.—Number these, stating gauge and size. Zinc is frequently used instead of lead for these on account of the lesser thickness of the former material, thus working in between the slates and tiles without the awkward tilt caused by the greater thickness of the lead.

Rain-pipes, *per foot run*, stating gauge and diameter and the description of joints—"beaded" or otherwise—and how fixed. *Number* shoes, knees over plinths, &c.

Eaves gutters, *per foot run*, stating gauge, shape and size and how fixed; whether screwed through to fascia or fixed with iron brackets; in the latter case give description of brackets and the distance apart. *Number* ends, outlets, angles, &c., as described to iron gutters.

Coverings to Cornices, *&c.*, *per foot run*, generally, stating the gauge and the girt of moulding, *numbering* the angles, &c.

Labours, *&c.*, *per foot run.*—Welt, double welt, zinc nailing, &c. *Number* extra labour to cesspools, also labour and materials to finials, rain-water heads, &c., giving sizes and full descriptions.

Copper Work.

The system of measuring zinc work applies also generally to copper work, with this exception, that whereas the thickness of zinc is distinguished by "gauges," that of copper is by the number of ounces per foot superficial, as "14 oz.," "16 oz.," &c.

Hot Water Work.

Tubes, per foot run.—State diameter, the full description of tubes, whether "wrought iron welded," "steam," and if galvanised, and state that the item includes short pieces. *Number* bends, elbows, springs, tees, connectors, nipples, &c. *Note* that it is advisable to take "disconnecting pieces" and long screws in long lengths of pipes to enable the work to be disconnected for repairs in the case of stoppage, &c.

Cylinders, Tanks, &c.—Number these, stating whether copper or galvanised iron, with the thickness and also the capacity. They are frequently described as "tested up to lbs. per square inch." *Number* the connexions between pipes and cylinders and tanks and boiler, including the holes and the back nuts.

Valves, &c.—Note that these must be screwed for iron, and if no p.c. or l.p. is given, give full description and state that they are for "hot water." If baths or lavatories come fitted complete with valves, &c., take an item of "connecting hot-water pipe to bath valves, &c.," as the case may be.

At the end of the "Hot Water Work," in bill, take an item of "testing the hot water system," frequently described "at lbs. pressure."

Gas-fitter.

The gas-fitting is frequently put in as a "provisional sum but as it has sometimes to be measured, a few notes as to the system employed will be useful.

Tubing, per foot run, stating diameter, and whether "composition" or "wrought iron." If the latter, it is usual to include all bends, elbows, tees, short pieces, &c., stating this in the item. Where it is proposed to put in only the pipes, take "nipples" at the different "points to stop off.

The Gas Company usually lay on the gas up to the meter without charge. If the meter is supplied by the contractor, *number* this, describing the number of lights, and whether "wet" or "dry." If the meter is supplied by the company at a rental, take an item of "fixing only meter," including with it the length of lead pipe connecting the meter with the main. If a small meter, take a wood bracket for same.

Fittings are usually given at a p.c. or l.p., and if given as a lump sum, take an item as *number*, of fixing "wall brackets," "one (two or three) light pendants," as the case may be.

Number blocks for brackets.

Take an item of "attendance" on gas-fitting to "No. points," including with this holes through floors and walls, and fixing floor boards with screws for removal.

At the end of the gas-fitters' bill take an item of "Allow for testing gas services with gas-bag."

Bell-fitter.

Bell-fitting is also frequently put in at a "provisional sum," but if to be billed in detail the following system may be adopted :—

In the case of *Swing Bells*, *number* these, stating the weight to each, and whether pendulums are included, and take the wires as *numbers*, also including brackets, &c., and describing the wire, *i.e.*, material, B.W.G., &c., and stating if in tubes, and the material, and if bedded in plaster. Bill these as "No. pull from——to ring bell in——," and so on. This, of course, necessitates reference to the drawings, but a glance at the drawings will give a bell-fitter a better idea of the extent of the work than any measurement.

Number pulls (at p.c. or l.p.), also bell-boards (stating for No. bells).

In the case of *Electric Bells*, somewhat the same system can be adopted, but frequently one bell or gong answers for a number of points, in this case an "indicator" is required. *Number* this, stating for how many bells, and also the description of bell or gong. Describe the wires by B.W.G.,

and the covering of same. *Number* pulls as described for swing bells.

Take an item of attendance on "No. bells."

Speaking Tubes.

These are generally put in the bill as a "provisional sum," but if to be measured, the following system may be adopted :—

Tubing per foot run.—State diameter and material and the weight per foot or per yard run, including the bends. *Number* the brass bends or elbows at ends, and also the mouth-pieces (the latter at a p.c. or l.p.).

Take the cutting away and making good for these in detail, numbering holes through walls and floors and making good the plastering around.

Electric Lighting.

As this item is so much a question of quality of material, it is usual to obtain a price for this from some reliable fitter. Take, however, an item of attendance to "No. points."

CHAPTER XIV.

MODES OF MEASUREMENT.—*Continued.*

PLASTERERS' WORK.

Externally.

PLAIN face, *per yard superficial.*—Describe material—*i.e.*, whether Portland cement or otherwise—and the composition. (*Note.* The composition of the various items of plasterers' work generally appears as a heading). State if jointed to imitate masonry, and the finish of face, whether trowelled, or with imitation tooling or otherwise. *Reveals to windows*, if under 9 in. wide, are measured at *per foot run*, including the arris.

The faces of *pilasters*, if over 9 in. wide, are measured at *per foot superficial*, and if under this width at *per foot run.* State if to entasis, and if dubbing is included. The returns to pilasters should also be measured at *per foot run*, stating if to entasis and including the arris.

In the case of very small pilasters it is frequently advisable to measure same including the returns and arrisses at *per foot run*, complete, including with the item any dubbing required.

The *circular faces of columns* should be measured at *per foot superficial*, stating if to entasis.

Weatherings, if over 6 in. wide, should be measured at *per foot superficial*, and if under this width at *per foot run*, including dubbing if required.

Strings and Cornices, if not less than 12 in. girt, at *per foot superficial;* if under this girt at *per foot run*, including dubbing if required, the weatherings at top being measured separately. *Note.* A rough stone core will frequently be found necessary for cornices of large projection. Measure this at *per foot superficial*, stating the thickness, and measure any labour beyond a rough square edge at *per foot run.*

Measure at *per foot run*:—Arris, narrow return and arris, rustications, and all similar labours. Also narrow margins (not exceeding 4 in. wide), enrichments (giving description and girt), and dentil courses (giving size of dentils and the distance apart, and stating if moulded or plain).

Number mitres, ends, &c., to weatherings and mouldings, averaging the widths and girts to superficial items, and allowing those to running items to follow the items; also caps, bases, bands and neckings to pilasters, with returns, mitres, and ends complete (these are sometimes measured at *per foot run*, stating that the items are in short lengths to pilasters, and the mitres, ends, &c., *numbered*), angles to enrichments and dentils, also key blocks, modillions, and all similar items.

General Note.—Keep all circular work separate, and in the case of moulded work state if circular on elevation or plan, and give the radius. Keep work under 12 in. in width separate at *per foot superficial*, and state that it is in narrow widths.

Sometimes in the case of elaborate enrichments a provision is put in the bill for this work as described for carving in wood and stonework.

Rough Cast.—Measure at *per yard superficial* unless under 12 in. wide, when measure at *per foot superficial*, giving full description of work, the kind of gravel, &c., and stating if on lath or brick. Include with the description any colouring, stating whether done afterwards or mixed with the gravel. Measure at *per foot run*, arris, narrow return and arris, and all similar labours; also narrow margins (not exceeding 4 in. wide).

Number making good around ends of timbers, sills, &c., and also any small pieces in panels, &c.

Internally.

Plastering to Walls, per yard superficial.—State whether two or three coat work, *i.e.*, "Render and set," or "Render, float, and set," and if finished for paint, keeping circular work separate, and if to soffits again separate. Work in widths under 12 in. should be billed at *per foot superficial*, the description stating that the work is in narrow widths.

Plastering to Partition, per yard superficial.—Measure all as described to walls, including with the description the lathing; if the latter is of wood state whether "lath" (*i.e.*, single), or "lath and half." In the case of metal lathing give description and state how fixed.

Panelling on Walls and Partitions.—If large, *i.e.*, averaging over a yard superficial in each measure the plastering at *per yard superficial*, and stating that the work is in panels, but if in small panels at *per foot superficial*, giving some idea in the description as to the size of panels. Margins are generally measured at *per foot run*, stating the width, and, if square or moulded on edge only, including the return and arris or the moulding with the item, *numbering* the mitres, &c. Bolection mouldings are measured at *per foot run*, stating the girt and *numbering* mitres, &c. If the panels and margins are not on the same plane, include with either the plastering to panels or margins (whichever projects) the dubbing required.

Panelling to jambs, soffits, and beams is frequently measured at *per foot superficial*, and described as in "panels and margins," giving a description of the panelling and the mouldings around same.

Ceilings, per yard superficial.—State whether two or three coat work as described for walls, and if on lath include the lathing, as described to partitions. Keep circular ceilings and coves separate, stating the radius, again separating groined ceilings. Take with the latter labours to groin point, &c., at *per foot run.*

Dubbing, per yard or per foot superficial, as described to plastering to walls.

Note.—Dubbing will be required in all cases where plastering exceeds 1 in. in thickness.

Cornices, per foot superficial, if 12 in. girt and over; if under, at *per foot run.* State if on lath. Keep circular cornices separate, stating the radius. *Number* mitres (external and internal), stopped ends, returned ends, &c., averaging the girts to the superficial items, allowing those to running items to follow the items.

Bracketing, per foot superficial.—Bracketing is not usually required for cornices under 12 in. girt, and frequently not

for those considerably over this girt. If the architect gives no indication upon his drawings as to the character of the cornices, the surveyor should make inquiry as to this. Failing a detail, the usual allowance is two-thirds of the girt of the cornice as the girt for the bracketing Keep bracketing plugged to walls separate. Take as *numbers* angle brackets, average the girts.

Enrichments, *per foot run*, giving description and stating the width or girt, and that the work includes modelling. Keep circular work separate, the cornice being measured across the enrichment, the latter having to be inserted after the cornice has been run. *Number* angle enrichments, &c.

Modillions.—Number these, giving full description and size. A sketch will frequently be required for these. When the bed mould in a cornice breaks around the modillion, number this as an "extra," including with the item the extra mitres.

Ceiling ribs, *per foot run*, stating the girt, keeping circular pieces separate, and stating the radius. *Number* mitres (birds-mouth, two-way, three-way, &c.), intersections, &c. Very short lengths of ribs are better *numbered*, including with the item the mitres, &c. *Note.* The plastering to a ceiling divided by ribs must be kept separate, and described as such.

Labours, *per foot run.*—Arris, bull-nose angle (stating the girt), chamfers (stating the width), mouldings (stating the girt). Narrow margins (under 4 in. wide). *Number* mitres and stops to chamfers and mouldings (stating the width or girt of the chamfers and mouldings, and description of stops whether plain, splayed, moulded, or otherwise) ; making good plastering around handrails, gratings, and chimney-pieces.

Cement Work.

Dadoes, *per yard superficial*, describing if finished for paint. Flush beads and flush mouldings in dadoes are measured at *per foot run*, stating the girt, that to rakes of staircases being generally kept separate ; keep separate that also to long ramps. *Number* mitres, stops, short ramps, &c., in beads and mouldings, and also take an item as *number* of making

good cement dado over steps where they occur, stating if square or moulded.

Skirtings per foot run, stating the height, and if flush or projecting, and the finish at top, *i.e.*, beaded, moulded, or square. If elaborately moulded, give the girt of moulding. If skirtings project, include dubbing with the item. *Number* mitres, ends, rounded angles, &c.

Labours, per foot run.—Arris, bull-nose angle, chamfer (stating the width), moulding (stating the girt), with the mitres and stops *numbered* as previously described.

Angles, &c. (*labour and materials*), *per foot run.*—Angle and arris, bull-nose angle (stating the girt), chamfers (stating the width), moulding (stating the girt), with the mitres and stops *numbered*, as previously described. It is usual to describe these items as "including narrow returns" where they are in plastered walls; but where they are at the edge of a cement reveal under 9 in. wide, include with the item, *e.g.*, "moulded angle in. girt with one narrow return and one return in. wide," or otherwise, and made good up to stone or brickwork, or joinery, as the case may be.

Work on Old Walls, &c.

Hacking, per yard superficial.—State whether this is merely hacking the face for key, or hacking off old plastering or cement work, and hacking for key. *Note.* Some old walls are so uneven that an item of "dubbing to level face" will have to be taken.

Connexions between New and Old Plasterings, per foot run.—State if on brickwork or on lath, and if between wall or partition and ceiling, and include painting the edges of old plaster with the item.

Making good.—The plastering in making good after removal of a wall or partition is generally measured at *per foot run*, stating if to wall, partition, or ceiling, and described as "in making good after removal of in. wall" or partition, as the case may be. Similar items of making good to cornices are *numbered*, including the connexions, and painting the edges of the old plaster in each case.

CHAPTER XV.

MODES OF MEASUREMENT.—*Continued.*

GLAZIERS', PAINTERS', AND PAPERHANGERS' WORK.

GLAZIERS' WORK.—In measuring glass it should be borne in mind that all parts of an inch are reckoned the full inch. It is especially necessary to note this in the case of sashes or casements divided into very small squares, as the difference then is considerable in proportion to the total quantity of the glass.

Sheet glass, per foot superficial.—State weight per foot superficial and also the quality, and keep squares not exceeding 2 ft. superficial, as in "small squares," and squares above this size in variations of 2 ft., *e.g.*, "not exceeding 4 ft. superficial," or 6 ft., &c., as the case may be. In the event of a large number of squares under 1 ft. superficial, it is as well to keep these separate. Keep glass "cut to shapes" separate, measuring the extreme sizes of squares, and if edges circular cut, described as "circular cut one edge," "two edges," or otherwise, as the case may be.

Very small squares of glass cut to shape are better *numbered.*

Take bending glass separate at *per foot superficial,* stating the size of square and the radius of the bent portion.

Ground Sheet Glass, per foot superficial.—Measure as described for clear sheet glass. Describe the edges to be sized before glazing. This prevents the oil from the putty spreading over the surface.

Fluted Sheet Glass, per foot superficial.—State weight per foot superficial and describe width of flutes, whether "wide," "medium," or "narrow" pattern; otherwise measure as described for sheet glass.

Coloured Sheet Glass, per foot superficial.—Measure as described for clear sheet glass, stating the colour. The

latter is important, as there is a great variation in the prices of the various colours.

Muranese Glass, per foot superficial.—State pattern (if possible) and the colour; otherwise measure as described for sheet glass.

Hartley's and other Rough Glass, per foot superficial.—State thickness, and if "Hartley's rolled" the description of ribbing if anything out of the ordinary, as "fluted rolled," describing whether "large," or "small" pattern, or "diamond rolled," with similar distinctions.

Glass in long lengths in skylights should be kept separate, giving the lengths of the squares.

If no thickness is specified for rough glass it is generally accepted that the ordinary thickness ($\frac{1}{8}$ in.) is what is required.

Cathedral Glass, per foot superficial.—Give full description and the colour; otherwise measure, as described for sheet glass.

Polished Plate Glass, per foot superficial.—Measure as described for sheet glass, with the exception that plate glass is billed in variations of 1 ft. in a square up to 10 ft. superficial, and above this at 2 ft.

Note. Plate glass is about $\frac{1}{4}$ in. in thickness, but if any special thickness is described an extra price will be charged, even if less than $\frac{1}{4}$ in.

The edges of plate glass should be described to be blacked to prevent the unsightly cut edge showing.

Silvered Glass, per foot superficial.—Measure as described for plate glass. As glass for silvering requires to be of specially selected quality, it is well to include the silvering with the glass. If, however, the silvering is measured separately, the glass must be described as "silvering quality."

Embossing, &c.—The ornamentation of glass varies so considerably in character that this is usually billed at a p.c. sum, either at *per foot superficial* or a lump sum as provision.

Bevelling Edges of Glass, per foot run, stating the width, and keeping circular work separate from the remainder.

Note. Glass in door panels is usually bedded in chamois leather or indiarubber strips; include this with the description.

Lead Lights, per foot superficial.—If ordinary sheet or cathedral glass in plain squares, describe the glass, the width of the lead cames, and the sizes and shapes of the squares, and whether with border, keeping portion in circular or shaped heads separate.

If lead glazing is in any degree elaborate a p.c. per foot should be specified. In this case ascertain whether the price includes for saddle-bars.

State whether lead glazing is fixed in deal sashes, iron casements, or grooves in stone or brickwork.

It is generally accepted that any square containing less than 1 ft. superficial shall be counted as a foot, whilst some makers claim that any lights under 1 ft. in width (whatever their length) shall be measured as a foot. It is advisable to state in the heading how the lights are measured.

If a p.c. price is stated for lead lights, an item should appear in the bill stating that the contractor is to supply all dimensions, templates, paper patterns, &c.

Painters' Work.—Distempering.

Walls and Ceilings, per yard superficial.—State if in more than one tint, and if colours of any special manufacture. Keep walls and ceilings separate. Measure dividing lines, borders, &c., at *per yard run*, stating the width, *numbering* any ornamental corners, &c.

Cornices, per yard run, stating the girt of cornice and number of tints, and if enriched, and if enrichment picked out, mention this also.

Painting Ironwork.

Girders, Stanchions, &c., per yard superficial, stating the number of coats before and after fixing, the latter frequently having to be done off ladders. This will apply generally to painting on ironwork.

Pavement Lights and Gratings, per yard superficial, stating if one or both sides measured, and measure accordingly. In the case of gratings it is advisable to mention, including edges, as the edges form such a large proportion of the whole.

Railings.—If plain bar, measure at *per foot run* as "on bar," but if ornamental at *per yard superficial*, stating if one or both sides measured, and measure accordingly.

The following items are billed at *per foot run.* Bolts and straps, eaves gutters (including brackets, if any), rain pipes (adding the lengths of shoes, swan-necks, &c.), crestings (stating the height), and any narrow running items such as ventilating gratings, &c.

The following items should be billed as *Numbers* :—Rain-water heads, hinges (in pairs, and stating length and description), small gratings (stating if one or both sides), brackets, chimney-pieces, and all items.

Painting Woodwork.

In describing painting to woodwork make it distinctly understood whether the priming is intended to be counted as a coat or not. It is advisable to describe the work as "knot stop, prime and paint in addition oils," which leaves no doubt as to the intention. Some architects specify a different colour for each coat, to enable the number of coats to be counted.

Woodwork generally, per yard superficial for work over 12 in. wide.—To save the trouble of measuring the edges, one-eighth is usually added to the quantity to cover this and also for panelling. This will be found in most cases sufficient, but in the case of very small or elaborately moulded panels will not be found so. The surveyor must, therefore, judge for himself as to this, and add accordingly.

Door Frames.—These are usually measured in with the linings and architraves, but if, as is sometimes the case, the frame is treated differently on one side to the other, it should be measured separately at *per foot run* each side and described as "one side."

Skirtings, per foot run.—If more than 12 in. high, state the height and whether double-faced.

Rails, per foot run, generally to work under 6 in. girt.

Wall Strings, per foot run, as described to skirtings.

Outer Strings, per foot run.—State if "cut" or "close." If the latter, state that it is for "both sides."

Balusters per foot run.—State if "square" or "turned."

Newels, per foot run.—As last described, but giving the size.

Skylight Rail, per foot run, measuring both sides and stating that it is for "one side."

Skylight Bar, per foot run, as last described.

Squares, number at per dozen.—Take both sides, thus one square counts as two. If over 2 ft. superficial, describe as "large," and if over 4 ft. as "extra large."

Window Frames, number.—Take both sides. If over 24 ft. superficial, describe as "large," and if over 36 ft. as "extra large." If with mullions and transom, describe the number of lights.

Casement Edges, number these regardless of size.

Number also small items, such as brackets and similar tems where measurement does not represent the quantity of work, also dressers. In the latter case describe as, 'Dresser as described on page of Bill."

General Note. If the work is to be finished in more than one tint, state the number. Picking out members of mouldings should, however, be measured separately at *per yard run.*

Painting on carving and dentil courses should be measured as an "extra," at *per foot superficial, per foot run*, or *number*, as the case may require.

If work to be "flatted," describe this.

Staining and Varnishing.—Measure as described for painting, stating the number of coats of size, stain, and varnish, and also the description of the stain and varnish, with the colour of the former, and if the work is finished in more than one tint.

Varnishing over Paint.—Measure as described for painting, giving a description of the varnish and the number of coats.

Graining and Marbling.—Measure as described for painting, describing the wood or marble imitated.

Polishing, per foot superficial generally. As this is a somewhat expensive item, it must be carefully measured, including all edges, girts of mouldings, &c. Measure at *per foot run* as "extra" carved enrichments and dentil

courses. Measure also at *per foot run* handrails, giving the size, if large, and including both the item for papering and tying up with string for protection.

Paperhangers' Work.

Wall papers appear in the bill at *per piece* at a p.c. or "stamped price," as the case may be. They are usually measured at the same time as the plastering. English papers are nominally 12 yards long and 21 in. wide, which equals 63 ft. superficial, but as they cut to waste, it is usual to allow one piece in seven for this; and so, to arrive at the number of pieces, the number of superficial feet is divided by fifty-four. This allowance, whilst being sufficient for ordinary small patterns, will not be so for large ones. The surveyor must therefore use his judgment in this, as he will have to in a good many points that will come under his notice. Foreign papers vary both in width and length, therefore in measuring these the surveyor must ascertain what the widths and lengths are before reducing the superficial area to the number of pieces. He will also have to do this in the cases of Japanese papers, Lincrusta, Anaglypta, and the numerous other wall coverings that are now in use. These are sometimes billed at a p.c. price *per yard superficial.*

Paper hung on ceilings should be kept separate from those on walls, and so described.

Friezes and Borders are generally billed at *per yard run* in the case of the latter, frequently at *per dozen yards.*

Include with the description of hanging papers, sizing and preparing walls.

Varnishing on paper, per yard superficial, stating the number of coats of size and varnish, and description of varnish.

CHAPTER XVI.

Examples of "Taking off."

The mode of measuring the various items having been described, a few typical examples of "taking off" will,

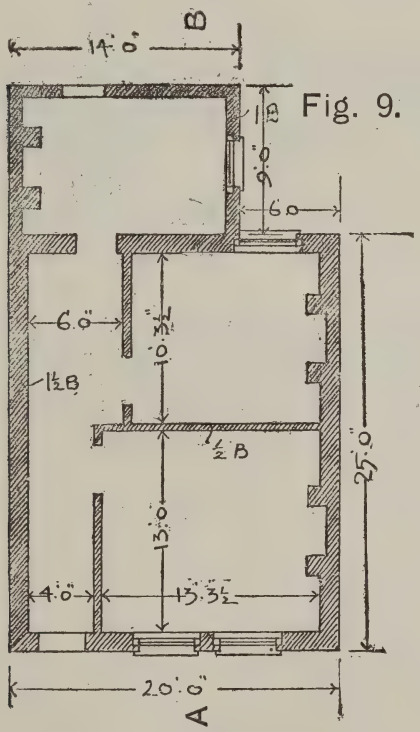


Fig. 9.

doubtless, be useful, and for this purpose are here given two examples, which will illustrate the methods of dealing with concrete, digging and brickwork; also deductions (shown

in the examples given of a window and door), and joiners' work. In the first instance, the work is taken up to the ground floor only, the method of measuring the brickwork above this line being merely a repetition. The sleeper walls are not taken here, they being generally measured (with their damp-proof courses) with the floors.

Fig. 10.

The first example is that of a small house (Figs. 9 and 10) purposely made as simple as possible, the extension of the principle being comparatively easy when once the general method of dealing with the subject is mastered.

		20.0
		Projections of footings and concrete ... ... 2/1.1 = 2.2
		22.2
		25.0
		2/1.1 = 2.2
		27.2
22 2 27 2	602.2	Remove top soil 6 in. deep, wheel, fill, and cart away.

		14.0 2/10½ = 1.9 15.9
15.9 9.0		
	141.9	Remove top soil 6 in. deep as last.
		Rear building.
		Front and back wall main building 20.0 *Side walls* ... ... 25.0 2/1.2 = 2.4 22.8 2 / 42.8 85.4
85.4 3.3 3.6		Excavating to surface trenches, throw
	970.8	out return, fill in and ram around foundation.
		14-in. wall.
		2/9.0 = 18.0 14.0 2/.9 = 1.6 = 12.6
30.6 2.6 3.6		Add
	266.11	*in. walls.*
		13.8 10.4 13.0 37.0
		Less crossings 3/1.1 = 3.3 .8 3.11 33.1
33.1 1.9 3.6		
	202.8	Add $4\frac{1}{2}$*-in. Walls.*
	1440.3	

85.4		
3.3		
1.6		
	416.0	
30.6		
2.6		Concrete (*as described*) in trenches,
1.6		and
	114.5	Deduct excavating as last
33.1		and
1.9		Add ditto, and wheel, fill, and cart
1.6		away.
	86.10	
	617.3	
85.4		
1.11		
.9		
	122.8	
30.6		
1.4		
.6		
	20.4	
33.1		
.9		
.3		
	6.2	Deduct excavating, and return, fill,
85.4		and ram,
1.2		and
1.3		Add ditto, and wheel, fill, and cart
	124.5	away.
30 6		
.9		
1.6		
	34.4	
33.1		
.5		
1.9		
	24.2	
	332.1	
85.4		
.9		2½ brick *footings.*
	64.0	
30.6		
.6		1¾ brick *ditto.*
	15 3	
37 0		
.3		1 brick *ditto.*
	0.3	

85.4 3.9		
	320.0	1½ brick wall *up to ground floor.*
30.6 4.0		
	122.0	1 brick wall *ditto.*
37.0 4.3		
	157.3	Half brick wall in cement.
85.4 1.2		
	99.7	
30.6 .9		
	22.11	Damp-proof course (*description.*)
37.0 .5		
	15.5	
	137.11	

5.4
2/1.1 = 2.2
7.6

2/ 7.6 / .9 3.6		
	39.5	Excavating and return, fill and ram as before *for chimney-breasts.*
		4.10 2/10½ 1.9 6.7
6.7 1 2 3.6		
	26.11	
	66.4	
2/ 7.6 / .9 1.6		
	16.11	Concrete in trenches as before, and
6.7 1.2 1.6		Deduct excavating as last, and
	11.6	Add ditto, wheel, fill, and cart away.
	28.5	

2	6.1		
	.9		*Width of breast* 5 4
	.9		*Average projection footings of* 9
		6.10	6.1
	5.5		
	1.2		
	.6		
		3.2	Deduct excavating and return fill in and ram 4.10
2	5.4		.7
	.9		and
	1.3		Add ditto and wheel, fill, and cart away. 5.5
		10.0	
	4 10		
	1.2		
	1.6		
		8.6	
		28 6	
2	6.1		
	.9		1 brick *footings.*
		9.2	
	5.5		
	.6		1½ brick *ditto.*
		2.9	
2	5.4		
	3.9		1 brick
		40.0	*up to ground floor.*
	4.10		
	4.0		1½ brick *ditto.*
		19.4	
2	5.4		
	.9		
		8.0	
	4.10		Damp-proof course.
	1.2		
		5.6	
		13.6	

Example of an ordinary sash and frame in a 14-in. wall. (Figs. 11, 12, and 13.)

			3 windows to bedrooms 3 ft. 3 in. by 6 ft. 6 in.
3			
	4.0		
	6 9		
		81.0	Deal cased frames having 1 in. inside and outside linings (*Note, state if outside*

linings chamfered or moulded) with 1 in. × ¾ in. bead mitred around inside, ¾ in. back lining, 1¼ in. pulley stiles tongued both edges, ½ in. parting slips, ½ in parting beads, 6½ in. × 3½ in. oak, double sunk, double weathered, check throated and beaded sill, and 2 in. ovolo moulded sashes; the upper in small squares, the lower in one square, double hung with brass-faced and bushed axle pulleys, iron weights. (*Note, lead if for plate glass*). *..... .....'s No..... best flax lines complete (in No..... frames).

* *Maker's name and number.*

Fig. 11

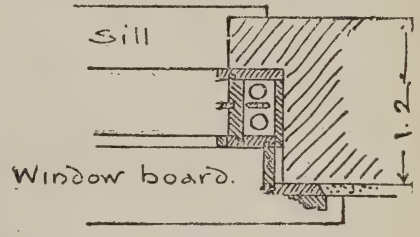


Fig. 12

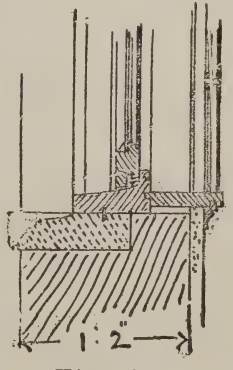


Fig. 13

3 / /	3.3	9.9	Splayed, splay rebated and throated bottom edge to 2 in. sash.
	3 / 2 / /	= 6	Extra to moulded horns to 2 in. sashes.
3 / /	4.0	12.0	1½ in. × ¼ in. galvanised iron tongue and bedding in red lead and groove in oak for iron tongue.
	3 / 1 / /	= 3	Sash fastener (*description*).
	3 / 2 / /	= 6	Sash lifts.
	3 / 2 / /	= 6	Sash handles.
3 / 6 / /	1.0 1.6	27.0	21 oz. sheet glass, each in one square (*upper squares*).
3 / /	3.0 3.0	27.0	Do. do. (*lower squares*). 4.0 2 / 6.9 = 13.6 17.6
3 / /	17.6	52.6	3½ in. × 1 in. lining, rebated both edges, tongued at angles, and including backings, and Groove. 17.6 4 / 4 in. = 1.4 18 10
3 / /	18.10	56.6	5 in. × 1 in. wrot, framed, splayed, grooved, and staff-beaded grounds, and 3 in. × 1¼ in. architrave moulding, including mitres. 4.0 2 / 5 in. = .10 4.10
	4.10 .7	8.6	1¼ in. moulded window board, rebate one edge and bearers.

	3 /2 / /	= 6	Notched and returned moulded ends to 1¼ in. window board.
3 /	4.8		
/		14.0	2½ in. × 1¼ in. bed-mould, rebated, and tongued in, including groove.
	3 /2 / /	= 6	Returned moulded ends.
3 /	4.6		
/	7.0		
		94.6	Deduct render float and set walls, and Deduct paper p.c. 1/6 per piece and hanging.
			A
	3·3		
3 /	6.6		
/		63.5	Ddt. ½ brick.
	4.0		
3 /	6.9		
/		81.0	Ddt. 1 brick.
	3 3		
3 /	6 9		
/		65.10	Ddt. red brick facing (*description*). 2 / 4½ in. = 9 in.
	·9		
3 /	6.6		
/		14.8	Add red brick facing (*reveals*).
	3.6		
3 /	·5		
/		4.5	Extra over ordinary brickwork for brick axed segmental arches (*Description of pointing, &c.*).
	3.9		
3 /	·9		
/		8.5	Add arches, and Deduct red brick facing.
	4.0		
3 /		12.0	Circular fair cutting and waste in red brick facing.
	·9		
3 /2 /		4.6	Fair skewback cutting and waste in ditto.

3/ /	3·3	9.9	Turning piece 4½ in. segmental soffit
3/ /	3·9	11.3	10 in. × 3 in. York stone, tooled, sunk, weathered, throated, and grooved sills.
	3/2/ /	= 6	Short, fair tooled ends, including stools for jambs.
	3/2/ /	= 6	Ends of sills made good to in facing.
			4.0 2/9 in. = 1.6
			5.6
3/ /	5.6 ·9 ·4	4.2	Fir lintel.
	3/1/ /	= 3	Extra labour, waste, and cement for relieving arch, 6 ft. girt, one brick on soffit by one brick high.
	3/6/ /	= 18	Fixing blocks (*description*).
	3/1/ /	= 3	Window frame bedded and pointed in cement and hair mortar, the sill bedded in white lead.
			A
	3/2/1 / /	= 6	Knot, prime, stop, and paint in addition, four times in oil on sash frame one side.
	3/2/6 / /	= 36	Ditto on squares.
	3/2/1 / /	= 6	Ditto on sash sheets.
3/ /	17.6 ·3	13.2	*Linings.* K. P. s and (4)
3/ /	18.10 ·9	42.5	on wood work and ⅛ *Ground and Architrave.*
3/ /	4.10 1.0	14.6	*Window board.*
		70.1	

Example of an internal door in 9-in. wall, with fanlight over. (Fig. 14).

3.0 7.0		
	21.0	2-in. four panel ovolo moulded both sides door.
1		Pair 4-in. wrot iron butts.
1 /		6-in. mortice lock and furniture, p.c., and Preparation in door.
		3.0 2 / 7.0 = 14.0 4 / 1 = .4 17.4
17.4		11 in. × 1½ in. cross-tongued jamb linings, double rebated, double beaded, double grooved, and tongued at angles, and including backings.
		17.4 4 / 4 = 1.4 18.8
2 / 18.8		
	37.4	4½ in. × 1 in. wrot framed, splayed, rebated, and beaded grounds, and 3 in. × 1¼ in. architrave moulding and mitres.
3.3		4½ in. × 3 in. framed, mitred, double rebated, and four times beaded transome.
3.0 1 6		
	4.6	2 in. ovolo moulded fixed fanlight in three squares, in No.....
2 9 1.3		
	3.5	21 oz. sheet glass in three squares.
2 / 1.8		
	3.4	11 in. × 1½ in. jamb lining as last, *extra length.*

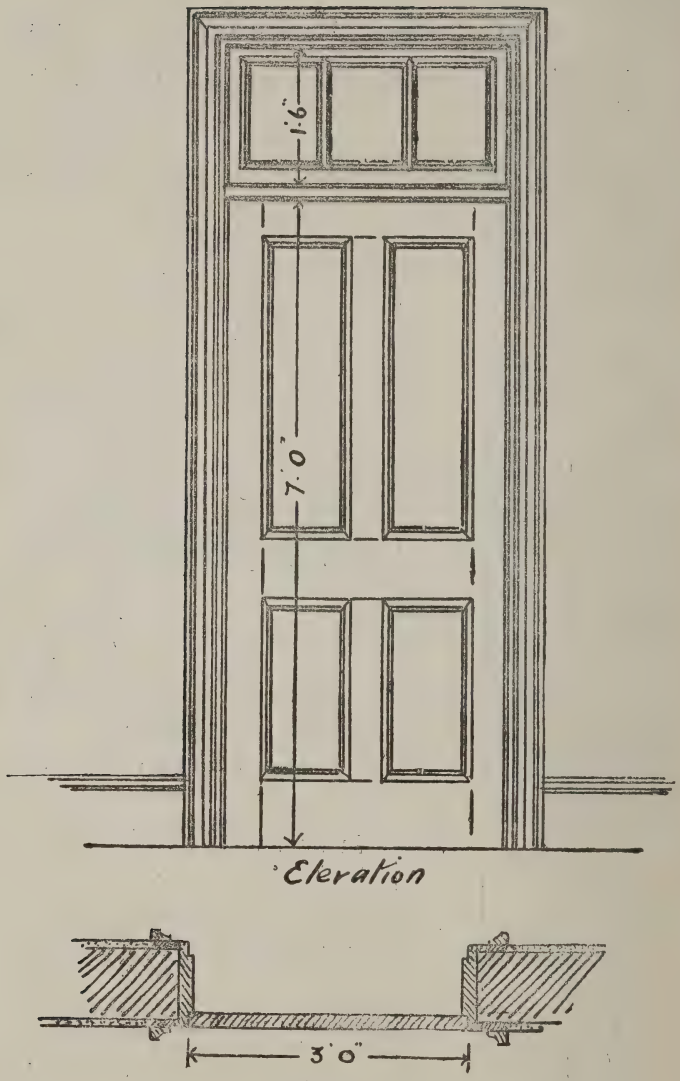
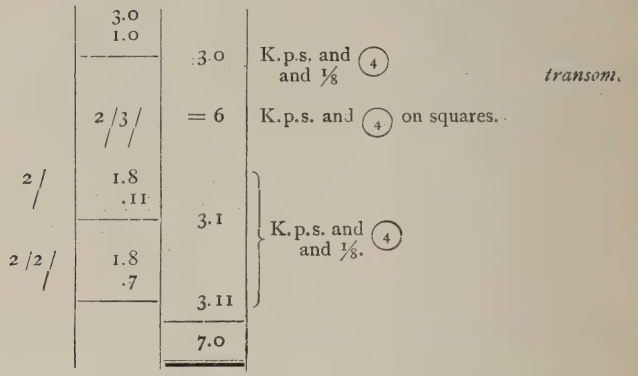


Fig. 14

2 /2 / /	1.8	6.8	4½ in. × 1 in. grounds as last, and 3 in. × 1¼ in. architrave moulding.
2 / /	3 9 9.0	67.6	Ddt. render float and set walls, and Ddt. paper p.c. 1/6 per piece.
2 / /	3.6	7.0	Ddt. 9 in. × 1 in. deal moulded skirting and grounds and backing, plugged, and Ddt. K.p.s and (4)
	2 /2 / /	= 4	Housings.
	3.3 8.11	29.0	Ddt. 1 brick.
	4.9 .9 .4	1.2	Fir lintel.
	1 / /		Extra labour and waste and cement for relieving arch 5 ft. 3 in. girt, one brick on soffit and one brick high.
	8 / /		Fixing blocks.
			A
2 / /	3.0 7.0	42.0	K.p.s. and (4) on woodwork, and ⅛ *door.*
	17.4 .11	15.11	*linings.*
2 / /	18.8 .7	21 9	*grounds and architrave.*
		79.8	



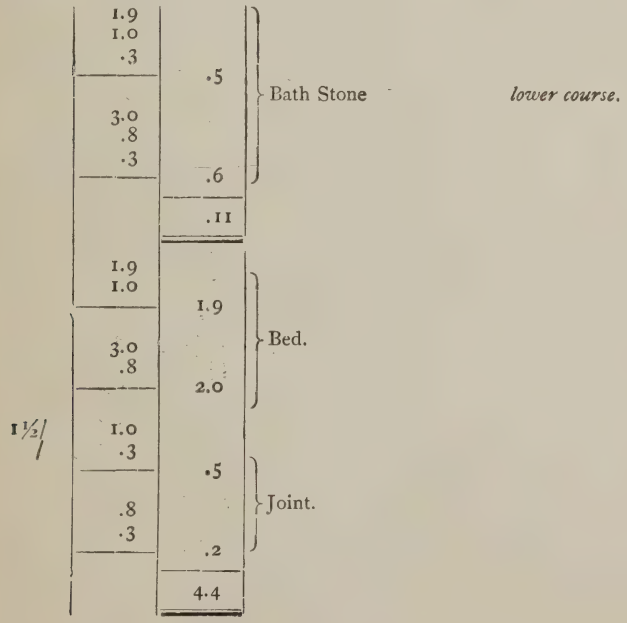
NOTE.—The foregoing are examples of taking joiners' work, with all incidental work and deductions with the item ; but should the surveyor elect to take the "openings" separately, the dimensions in both cases for these would be from A to A. In the same way the painting is here given merely as an example of measuring painters' work.

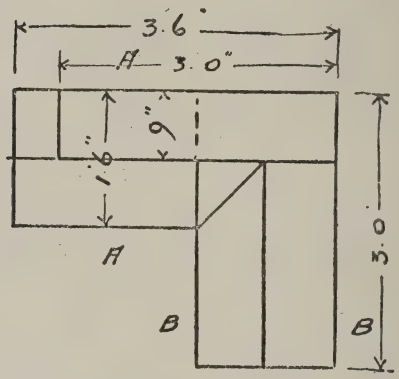
CHAPTER XVII.

EXAMPLES OF "TAKING OFF"—*Continued.*

THE two succeeding examples of measuring Stonework with their labours cover most of the items arising under this head (the system is described in Chapter VI.).

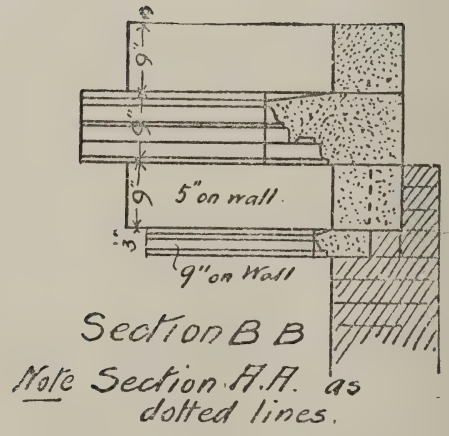
Example of Stone Cornice with blocking, &c., at an internal angle (Figs. 15 and 16).





Plan

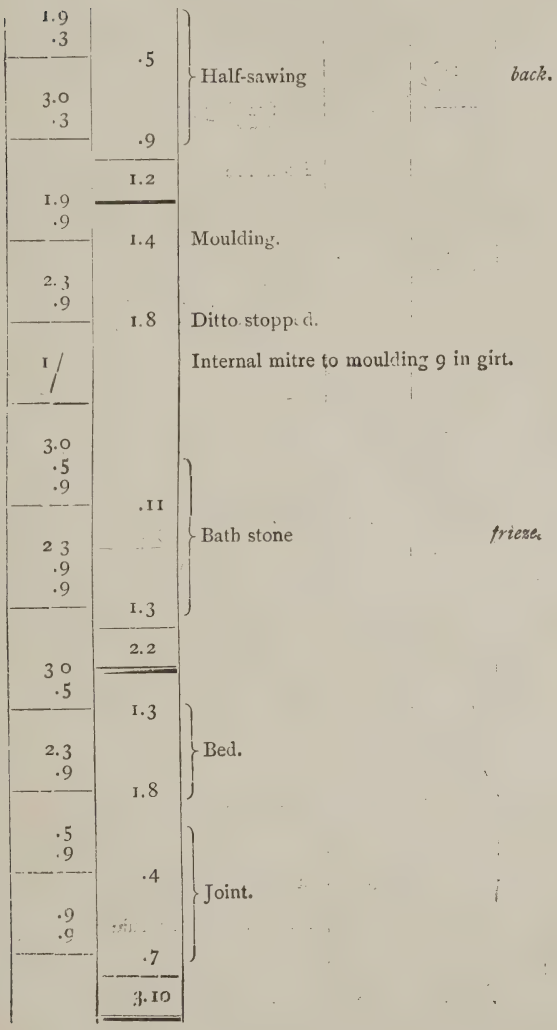
Fig. 15



Section B B

Note Section A.A. as dotted lines.

Fig. 16

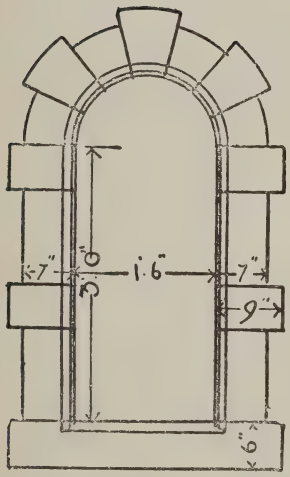

1.9
·3
·5
Half-sawing
back.
3.0
·3
·9
1.2
1.9
·9
1.4
Moulding.
2.3
·9
1.8
Ditto stopped.
1
Internal mitre to moulding 9 in girt.
3.0
·5
·9
·11
Bath stone
frieze.
2 3
·9
·9
1.3
2.2
3 0
·5
1.3
Bed.
2.3
·9
1.8
·5
·9
·4
Joint.
·9
·9
·7
3.10

				3·0
				2.3
				5·3
	5·3			
	·9			
		3.11	Half sawing and	*back.*
			Plain face	*front.*
	·9			
	·9			
		·7	½ joint and Deduct plain face	
				2.0
				3.0
	5.0			
	1 6			5.0
	·9			
		5.8	Bath stone	*cornice.*
	5.0			
	1.6			
		7.6	Bed.	
2 / /	1.6			
	·9			
		2.3	Joint.	
		9.9		
	2.0			
	1.6			
		3.0	Moulding.	
	2.3			
	1.6			
		3·5	Stopped Moulding.	
	1 / /		Internal mitre to moulding 18 in. girt.	
	2.0			
	.10			
		1.8	Sunk face	*top.*

	2.3 .10		
		1.11	Sunk face stopped.
	1 /		Internal mitre to sinking 10 in. wide.
			2.0 3.0
	6.6 .9		1.6
		4.11	Plain face. 6.6
	1.6 .9		
		1.2	½ joint.
	1 /		Cement and pebble double-V grooved joint, 18 in. long.
			3.0
	5.3 .9 .9		2.3
		3.0	5.3 Bath stone *blocking.*
	5.3 .9		
		3.11	Bed.
2 /	.9 .9		
		1.2	Joint.
	5.3 .9		
		.11	Plain face and Deduct ½ joint *top.*
2 /	5.3 .9		
		7.11	Plain face.
	1 /		Cement and pebble joint as last, but 9 in. long.

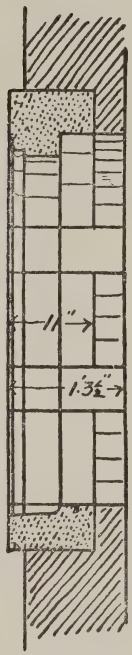
Example of Stone Window Dressings (figs. 17, 18 and 19) :—

	3.0		
	.11		
	.6		
		1.5	Bath stone *sill.*
	3.0		
	.11		
		2.9	} Bed and joint.
	.11		
	.6		
		.6	
		3·3	
	3.0		
	.6		
		1.6	Plain face *front.*
	3.0		
	.6		
		1·6	Half sawing *back.*
	1.10		
	.7		
		1.1	Sunk face.
	2 / /		Stoppings to sinking 7 in. wide.
	2 / /		2 in. lengths of moulding, 3 in. girt, stopped one end against splayed face.
	3.0	3.0	
			} 2 in. plain margin.
2 / /	.6		
		1.0	
		4.0	
	2 / /		2 in. lengths 2 in. plain margin.
	2.10		Stopped throat.
	3.0		Groove.



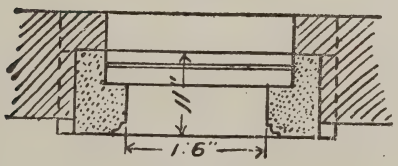
Elevation

Fig. 17



Section

Fig. 18



Plan.

Fig. 19

2 /2 / /	.7 .11 1.0			
		2.2	Bath stone	*jambs.*
2 /2 / /	.7 .11			
		2.2	Bed and joint.	
2 /2 / /	.11 1.0			
		3.8		
		5.10		
2 /2 / /	.7 1 0			
		2.4	Plain face and Half sawing	*front.* *back.*
2 /2 / /	.7 1.0			
		2 4	Plain face and Deduct half joint.	*side.*
2 /2 / /	.8 1.0			
		2.8	Rebated sunk joint.	
2 /2 / /	1.0			
		4.0	2 in. plain margin.	
2 /2 /	1.0			
		4 0	Moulding, 3 in. girt.	
2 /2 / /	.9 1.4 .6			
		2.0	Bath stone	*bonders.*
2 /2 / /	.9 1.4			
		4.0	Bed and joint.	
2 /2 / /	1.4 .6			
		2.8		
		6.8		

2 / 2 / / /	.9 .6		
		1.6	Plain face and Half sawing — *front.* *back.*
2 / 2 / / /	.7 .6		
		1.2	Plain face and Deduct half joint. — *side.*
2 / 2 / / /	1.1 .6		
		2.2	Rebated sunk joint.
2 / 2 / / /	.6		
		2.0	2 in. plain margin.
	2 / 2 / 2 / / / /	= 8	2 in. lengths of ditto.
2 / 2 / / /	.6		
		2.0	Moulding, 3 in. girt.
	2 / 5 / / /	= 10	Slate dowe's, mortices and cement.
4 / /	.7 .11 .7		
		1.3	Bath stone — *voussoirs.*
3 / /	.8 .11 .8		
		1.3	
		2.6	
4 / /	.7 .11	2.2	Bed and Sunk bed.
3 / /	.9 .11		
		2.1	
		4.3	

4/	·7		
	·11		
		2.2	} Circular joint
3/	.8		
	.11		
		1.10	
	2.5		
	·7		
		1.5	Circular sunk face
	.8		
	3 2		
		2 1	Circular rebated sunk joint.
	2.9		Circular moulding, 3 in. girt.
4/	·7		
	·7		
		1.4	Plain face and Half sawing
3/	.8		
	.8		
		1.4	
		2.8	
4/	·7		
		2.4	} 2 in. circular margin.
3/	.8		
		2.0	
	3/2/	= 6	2 in. lengths plain margin.

crown.

CHAPTER XVIII.

EXAMPLES OF "TAKING OFF."—*Continued.*

HAVING given in the two preceding chapters various examples of taking-off, in this chapter is given a somewhat comprehensive one, which, although extremely simple, will explain the process of "taking-off" facings, floor, roof (with examples of varying finishings to verges and at eaves, together with hips and valleys, also lead and iron gutters), and also plastering. This, with those previously given, will form the basis of an example of "Abstracting" and "Billing" in succeeding chapters. The roof here illustrated is supposed to be tiled, but the example can be readily applied to slating, as described in Chapter VI.

BRICKWORK AND FACING ABOVE FIRST FLOOR LEVEL.

				2 / 12.0 = 24.0
				2 / 20.9 = 41.6
				2 / 3.0 = 6.0
				71.6
	71.6			
	10.0		1½ brick	
		715.0		*(up to top of plate.)*
	20.9			
	1.6		1 brick	*side parapet.*
		31.2		
	13.6			
	1.6			
		20.3		
½ /	11.0		Add	
	5.6			*gables.*
		30.3		
½ /	10.0			
	5.0			
		25.0		
		106.8		

2 /	8.0		
	·3		
		4.0	1 Brick.
2 /	7.6		waste
	·3		
		3.9	
		7.9	14.3
			3.0
			20.9
			38.0
	76.0		76.0
	10.0		
		760.0	Red brick facing (*Description.*)
			14.3
			Ends of parapets 2 / 9 in. = 1.6
			36.6
	36.6		
	2.9		*parapet.*
		100.5	Add facing
½ /	11.0		
	5.6		
		30.3	*gable.*
	20.0		
	1.0		
		20.0	
	8.6		Add
	·9		
		6.5	*inside of parapets.*
	10.3		
	·9		
		7.8	
			20.0
		924.9	2 / 1.3 = 2.6
			2 / 8.0 = 16.0
			38.6
	38.6		
		38.6	9 in. × 4½ in. red brick on edge coping, set and pointed in cement, and double course of tile creasing in cement under, and cement fillet both sides.

2/	2/	= 2	Returned ends to last.
	1/	= 1	Mitre.
	1/	= 1	Apex mitre.
	2/	= 2	Mitres of raking with horizontal.
2/			
2/	8.0		
		32.0	Fair raking cutting, and waste in red brick facing.
2/	8.6		
		17.0	
		49.0	
2/	8.6		
	·5		Rough Cutting.
		7.1	
			13.0
			3.0
			6.0
			2/3.0 = 6.0
			28.0
	28.0	28.0	Labour to beam filling.

FLOOR AND SKIRTING.

2/	18.6		
	·4½		
	·3		
		3.6	Fir plate.
8/	12.9		
	·9		
	·2½		
		15 11	
8/	15 9		
	·9		Fir framed floor joists.
	·3		
		23.8	
		39.7	

16
Less in bay 8
8
in bay.

18.6 9.3	18.6 9.3	2 × 2 Double herring-bone strutting to 9 in. joists.
	27.9	
12 0 18.6 3.0 9.3	222.0 27.9	Pugging (*description*) joists measured in.
	249 9	and
		in. Rough sound boarding on in × in. fillets nailed to joists (joists measured in).
12.0 18.6 3.0 9.3	222.0 27.9	in. Flooring. (*Description.*)
	249.9	
		12.0 18.6 3.0 33.6 67.0
67.0	67.0	9 in. × 1 in. Deal moulded skirting and grounds, and backings plugged to wall, and k.p.s. and
6/	= 6	Internal angles. (4)
2/	= 2	External angles.

				19.0
				12.9
			ROOF.	7.0
				3.3
				2/3.6 = 7.0
	49.0			
	.4½			49.0
	.3			
		4.7	Fir plate.	4.0
				2.0
2 /	6.0			6.0
/	4½			
	.3			
		1.2	Add	*Dragons.*
		5.9		
				13.0
				8.6
	21.6			21.6
	.9			
	.2			
		2.8	Fir framed in roof	*ridge.*
				12.9
	24.3			11.6
	.7			
	.2			24.3
		2.4	Add	*hips.*
2 /	11.0			
/	.7			
	.3			
		3.3	Add	*valleys.*
12 /	9.0			
/	.4½			
	.2			
		6.9		
13 /	10.6			
12/	.4½			
	.2			
		16.5	Add	*rafters.*
2 /3/	9.0			
/ /	.4½			
	.2			
		3.5		
		34.10		

5 /	7.6		
	·4½		
	.2		
		2.4	
2 /	5.0		Fir framed in roof. *collars.*
	·4½		
	.2		
		.8	
		3.0	
18 /	12.9		
	·5½		
	.2		
		17.6	Add *ceiling joists.*
3 /	10.0		
	·5½		
	.2		
		2.4	
	10.0		
	·5½		
	.1	.5	Add *extra for trimmer.*
		20.3	
	3 /		Ends timbers cut and pinned *ridge.*
	21.6		
		21.6	Double splayed edge to 2 in. hips and ridge.
	24 3		
		24.3	
		45.9	
	13.0		
	7.3		
		94.3	Tiling.
	26.6		(*Description*) 13.6
	10.3		13.0
		271.8	and 26.6
2 /	3.0		
	8.6		in. rough boarding,
		51.0	edges shot to roofs,
			and
		416.11	in. × in. battening
			for tiling.

				12.9
				10.0
2 / /	22.9 .6			22.9
		22.9	Add tiling only	*for cutting at hips.*
2 / / 2 /	11.0 .6	22.0		*for cutting at valleys.*
		44.9		
2 / /	22.9 .3			
2 / 2 / /	11.0 .3	11.5	Add boarding and add battening	*for cuttings as last.*
		11.0		18.9
		22.5		12.9
				5.6
				3.0
				2 / 3.0 = 6.0
	46.0 .6			46.0
		23.0	Tiling only	*eaves.*
2 / /	13.0	26.0	Splayed edge to	in. roof boarding.
2 / /	8.9	17.6		*next ridge.*
		43.6		
2 / /	22.9	45.6	Do. cross grain.	
2 / 2 / /	11.0	44.0		*next hips and valleys.*
		89.6		
	22.9	22.9	Extra to hip tile (*description*).	
2 / /	11.0	22.0	Extra to valley tile (*description*).	

23.0	23.0	Ridge tile (*description*). 14.0 9.0 — 23.0
1 / /		Fair end.
1 / /		End cut to face of wall.
1 / /		End cut to slope of roof.
1 / /		Returned end at hip.
1 6 1.6		
	2.3	5 lb. lead flashing (*at junction of ridge with slope of roof*). 7.3 2.3 10.3 2/8.6 = 17.0 — 36.9
36.9		
	36.9	Extra to tile and half at verge. 2.3 2/8.6 = 17.0 — 19.3
19.3		
	19.3	Pointing to verge. 46.0 36.9 — 82.9
82.9		
		Tilting fillet. *Upper end*... ... ... 1.3 *Lower end*... ... ... .9 — 2.0 — *Avrage width* 1 0
20.3 1.0		
	20.3	1 in. gutter board and bearers.
1 / /		Short drip cross-rebated, and rounded.

		20.3
		Drip 8
		Turn up 6
		Turn down... 3
		21.8
		× 1.0
		Next wall 6
		Under tiles 9
		2.3
21.8		
2.3		
	48.9	6 lb. lead gutter.
		20.3
		End 2.3
		Angles ... ... 2/6 = 1.0
		Passing ... ... 2/6 = 1.0
24.6		24.6
.6		
	12.3	5 lb. lead flashing
		20.3
		2.3
		22.6
22 6		
	22.6	Rake out and point in cement to lead flashings and lead wedging.
		24
		33
		57
57 / /	= 57	No. — gauge zinc soakers, 8 × 6, and fixing.
		7.3
		10.3
		17.6
		Ends 2/2/6 in. = 2.0
		Passing .6
		20.0
20.0		
.8		
	13.4	5 lb. stepped flashing.

17.6	17.6	Rake out and point as before, but to stepped flashings and lead wedging. 13.0 6.0 3.0 2/3.0 = 6.0 28.0
28.0	28.0	in. × in. wrot, splayed, and (*staff-beaded, moulded, or chamfered*) fascia to eaves and k.p.s. and (4)
4/	= 4	Returned ends.
2/	= 2	Internal mitres.
1/	= 1	External mitre.
28.0	28.0	Eaves gutter (*size and description*) screwed to fascia, and (4)
4/	= 4	Extra to stopped ends.
1/	= 1	Extra to external angle.
2/	= 2	Ditto to internal angles.
2/	= 2	Ditto to outlets and gratings (*description*).

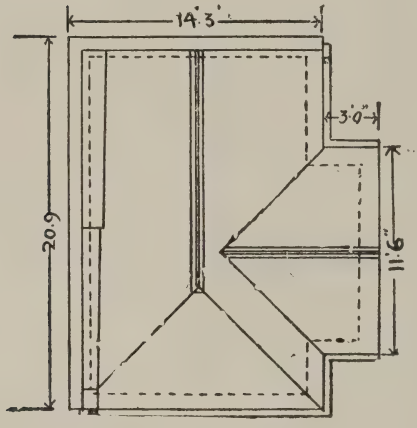
2 / /	12 0	24.0	in. diameter (*description*) rainwater pipe and fixing with to brick facing, and (4)
	2 / /	= 2	Shoes and (4)

NOTE.- In the foregoing example soakers are taken to be used where the tiling abuts against the brickwork; but should these not be specified the only variation will be to alter the width of the lead flashing from 8 in. to 1 ft. 2 in., thus allowing 6 in. to lie upon the tiles.

PLASTERING.

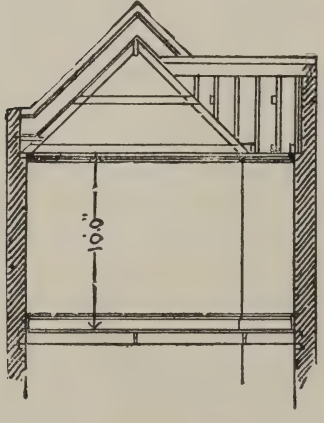
12.0 18.6	222.0	Lath, plaster, float, and set, and twice whiten ceiling.
3.0 9.3	27.9	
	249 9	
		12.0 18.6 3.0 33.6 67.0
67 0	67.0	Plaster moulded cornice, 9 in. girt, and twice whiten.
6 / /	= 6	Internal mitres.
2 / /	= 2	External mitres.
67.0 10.0	670.0	Render, float, and set walls.

	67.0 9.0		
		603.0	Paper, p.c. 1/6 per piece and hanging.
2/	10.0		
/		20.0	Keene's cement angle and arris.



Dotted lines show plan of Room.

Fig. 20



Ridge 9"x2"
Hips 7"x2"
Valleys 7"x3"
Rafters 4½"x2"
Ceiling joists 5½"x2"
Collars (one to every fourth rafter) 4½"x2"

Floor joists 9"x2½"
Do into Bay 9"x3"

Fig. 21

CHAPTER XIX.

Example of Abstracting.

Below is given an example of "Abstracting," and for this purpose the dimensions previously given in the examples of "taking off" have been used as a basis. Whilst, of course, the comparatively small number of dimensions in these examples do not cover by any means the whole of the ground, they will be found sufficient to explain the system. The order of items generally can be taken from the chapters on "Modes of Measurement." Although owing to the exigencies of space the description of the item of sashes and frames has been contracted on the abstract it is advisable always to put the full descriptions upon the abstract, so that when the work has been "abstracted" and "checked" the dimensions may be put aside. This, although taking somewhat longer in the actual abstracting, will in the subsequent stage, *i.e.* "billing and checking," be found to save considerable time.

Each item as it is abstracted is crossed through with a vertical line, and again when checked, the latter being generally done in red ink, and the item on the abstract "ticked" in the same colour.

The deductions and making up on the abstract are also crossed through and ticked in the same manner.

In "making up" the brickwork it will be seen that one third is taken off the item of "one brick," this is to reduce it to 1½ brick thickness, which is then added to the 1½ brick column.

DESCRIPTION

EXCAVATOR AND BRICKLAYER.

Sup.
Remove top-soil, 6 in. deep, wheel, fill, and cart away.

602.2
141.9

743.11
83 yards.

Cube.
Excavating to surface trenches, throw out, return, fill in, and ram around foundations.

1,440.3	Ddt.
66.4	
	617.3
1,506.7	332.1
1,006.3D	28.5
	28.6
500.4	
	1,006.3

19 yards.

Do. and wheel, fill, and cart away.

617.3
332.1
28.5
28.6

1,006.3

37 yards.

Concrete (*as described*).

617.3
28.5

645.8

23½ yards.

Sup.
Brickwork in mortar.

1B	1½B
64.0	64.0
15.3	7.8
9.3	320.0
122.0	2.9
9.2	19.4
40.0	715.0
106.8	
7.9	1,128.9
	21.2D
374.1	
110.0D	1,107.7
	176.1
264.1	
88.0⅓	1,283.8
176.1	

4 rods 196 ft.

Ddt.

1B	1½B
81.0	21.2
29.0	
110.0	

Half-brick wall in cement.

157.3

Rough cutting.

7.1

Damp-proof course.

137.11
13.6

151.5

Run.
Labour to beam filling.

28.0

Rake out and point in cement to lead flashings.

22.6

Ditto to stepped flashings.

17.6

OF WORK.

FACINGS.

Nos. Ends of timbers cut and pinned.

3

Sup. Red brick facing (*description*).

760.0 Ddt.
164.9
14.8 65.10
8.5
939.5
74.3 74.3
865.2

Run. Fair raking cutting and waste in red brick facing.

49.0 Do. to skewbacks. 4.6

Nos. Ends of sills made good to in facings.

6

Extra labour, waste and cement to relieving arches. 1B by 1 B.

3 = 18.0
1 = 5.3
4 = 23.3
Avge. 5.10

Extra over ordinary brickwork for red brick axed segmental arches (*description of pointing, &c.*).

4.5
8 ›
12.10

Fair circular cutting and waste in red brick facing.

12.0

9 in × 4½ in. red brick on edge coping, set and pointed in cement, and double course of tile creasing in cement under, and cement fillet both sides.

38.6 Returned ends. 2

Window frame bedded and pointed in cement and hair mortar, the sill bedded in whitelead.

3

Fixing blocks (*description*).

18
8
26

Mitre.

1 Apex mitre.

1 Mitres of raking with horizontal. 2

DESCRIPTION

MASON

BATH STONE.

Cube.
Stone (no labour) and hoisting and facing.

0.11
2.2
5.8
3.0
1.5
2.2
2.0
2.6
19.10

Sup.
Half sawing.

1.2
3.11
1.6
2.4
1 6
2.8
13 1

Beds and joints.

4.4
3.10
0.4
9.9
0.7
3.11
1.2
3.3
5.10
6.8
4 3
43 11
3 8D
40.3

Ddt.
1.11
1.2
0 7
3.8

Sunk bed.

4.3

Circular joint.
4.0

Rebated sunk joint.

2.8
2.2
4 10

Do. circular.
2.1

Plain face.

3.11
4.11
3.11
7.11
1.6
2.4
2 4
1.6
1.2
2.8
32.2
0.7D
31.7

Ddt.
0.7

Sunk face.

1.8
1.1
2.9

Do stopped.
1.11

Do. circular.
1.5

Moulding.

1.4
3.0
4 4

Do. stopped.
1.8
3.5
5.1

OF WORK.

Run.
2 in. plain margin.

4.0	Do.
4.0	circular.
2.0	
	4.4
10.0	

Nos.
2 in. lengths,
2 in. plain margin.

2
8
6
16

Cement and pebble double V grooved joint.

1 = 18 in.
1 = 9 in.
2 = 27 in.

Avge. $13\frac{1}{2}$ in.

Groove.

3 0

Stopped throat.

2.10

Internal mitre to sinking.

1 = 10 in.	Stoppings to do.
	2 = 14 in.
	= 7 in.

Slate dowels, mortices, and cement.

10

Moulding, 3 in. girt.

4.0	Do.
2 0	circular.
6.0	2.9

Internal mitre to moulding.

1 = 9 in.
1 = 18 in.
2 = 27 in

Avge. $13\frac{1}{2}$ in.

2 in. length of moulding, 3 in girt, stopped one end against splayed face.

2

DESCRIPTION

MASON (*Cont.*), TILER, CARPENTER.

Runs.
10 × 3 York stone, tooled, sunk, weathered, throated, and grooved sills.

11.3

Sup.
Tiling (*description*)

416.11
44.9
23.0

484.8

Run.
Turning piece 4½ in. segmental soffit.

9.9

Cube.
Fir in plates and lintels.

4.2
3.6
5.9
1.2

14.7

Short fair tooled ends, including stools for jambs.

6

Run.
Extra to tile and half at verge.

36.9 Pointing to verge.

19.3

Extra to hip tiles (*description*).

22.9 Extra to valley tile (*description*).

22.0

Ridge tile.

23.0

Fair end.

1 End cut to face of wall.

1 Do. to slope of roof.

1 returned end at hip.

3

Fir framed in floors.

39.7 Do. in roofs.

34.10
3.0
20.3

58.1

OF WORK.

Sup.	*Run.*	*Nos.*
in. × in. battening for tiling.	Splayed edge to in. roof boarding.	Short drip in gutter, cross rebated and rounded
416.11 Ddt.	43.6 Do. cross-grain.	1
22.5	89.6	
439.4		
in. rough boarding edges shot to roofs.	Double splayed edge to 2 in. hips and ridge.	
416.11 Ddt.	45.9	
22.5		
439.4		
in. rough sound boarding on in. × in. fillets nailed to joists (joists measured in).	Tilting fillet.	
	82.9	
249.9		
1 in. gutter board and bearers.	2 × 2 double herring bone strutting to 9 in. joists.	
20.3	27.9	
	in. × in. wrot splayed (*staff-beaded, moulded, or chamfered*) fascia to eaves.	
	28.0 I. M.	
	2 E.M.	
	1 R.E.	
	4	

DESCRIPTION

JOINER.

FLOORS.
Sup.
in. flooring (*description*).

249.9

DOORS.
Sup.
2 in. four panel ovolo moulded both sides door.

21.0

WINDOWS.
Sup.
2 in. ovolo moulded fixed fanlight, in three squares.

4.6 = 1

Skirtings.

Run.
9 × 1 moulded skirting and grounds, and backings plugged to wall.

67.0
7.0D Ddt.
7.0
60.0

Preparation in door for mortice lock.

1

Sashes and frames (*description*).

81.0 = 3

Run.
Splayed, splay rebated, and throated bottom edge to 2 in. sash.

9 9

Internal angles.

6 External angles

2 Housings

4

No.
Extra to moulded horns to 2 in. sashes.

6

OF WORK.

DOOR AND WINDOW FINISHINGS.

Sup.

$1\frac{1}{4}$ in. moulded window board, rebated one edge, and bearers.

8 6 Notched and returned moulded ends.

6

Run.

Labour. Groove.

52 6 Do. in oak.

12.0

$3\frac{1}{2}$ in. × 1 in. lining, rebated both edges, tongued at angles, including backings.

52 6

11 × $1\frac{1}{2}$ in. cross tongued jamb lining, double rebated, double beaded, double grooved, tongued at angles, including backings.

17.4
3.4

20.8

$4\frac{1}{2}$ in. × 1 in. wrot framed, splayed, rebated, and beaded grounds.

37.4
6.8

44.0

5 in. × 1 in. wrot framed, splayed, grooved, and staff beaded grounds.

$2\frac{1}{2}$ in. by $1\frac{1}{4}$ in. bed mould, rebated and tongued in, including groove.

14.0 R.M E.

6

3 in. × $1\frac{1}{4}$ in. Architrave moulding, including mitres.

56.6
37.4
6.8

100.6

$4\frac{1}{2}$ in. × 3 in. framed, mitred, double rebated, and four times beaded transom.

3.3

IRONMONGERY.

Nos.

Pairs 4 in. wrot iron butts.

1

6 in. mortice lock and furniture, p.c.

1

Sash fasteners (*description*).

3 Sash lifts.

6 Sash handles

6

Run.

$1\frac{1}{2}$ in. × $\frac{1}{4}$ in galvanised iron tongue, and bedding in red lead.

12.0

£6.6

DESCRIPTION

FOUNDER & SMITH,

CAST IRON.

Run.

—in. diameter R.W. pipe and fixing with ——to brick facing.

24.0 Shoes.

2

Eaves gutter. (*size and description*). screwed to fascia.

28.0

Extra to stopped ends.

4 Do. to E.A.

1 Do. to I.A.

2

Do. to outlets.

2

PLUMBER,

Sup.

5 lb. lead in gutters and flashings.

2.3	6 lb.
12.3	do.
14.6	48.9
×5	×6
73 lb.	293 lb.
293	
366 lb.	

cwt. 3.1.2.

5 lb. stepped flashings.

13.4
×5

67 lb.

cwt. 0.2.11.

Run.

Lead wedging.

22.6
17.6

40.0

No.

No. gauge, zinc soakers, 8×6 and facing.

57

Grating over outlets to eaves gutter (*description*).

PLASTERER,

Sup.

R. F. and S. walls.

670.0	Ddt.
162.0D	
	94.6
508.0	67.6
56 yards	162.0

L. P. F. and S. ceiling.

249.9

28 yards.

Fugging (*description*), joists measured in.

249.9

18 yards.

Run.

P.M.C. 9 in. girt.

67.0	I.M.
	6 E.M.
	2

Keene's cement, angle and arris.

20.0

OF WORK.

GLAZIER AND PAINTER.

Sup.
21-oz. sheet glass in squares not exceeding 2 ft. super.

27.0	Do.
3.5	n. e.
30.5	9 ft. sup.
	27.0

Sub.
Twice distemper plaster ceiling.

249.9

28 yards.

Run.
Do. plaster cornice, 9-in. girt.

67.0

22 yards.

Run.
(4) on R.W.P.

24.0

(4) on shoes to do.

2

(4) on eaves gutter.

28.0

Sup.
Knot, prime, stop, and (4) on woodwork and ⅛.

70.1
79.8
3.0
7.0

159.9
20.0⅛

179.9
= 20 yards.

Run.
On skirting.

67.0	on eaves
7 0D	fascia.
60.0	28.0
Ddt.	
7.0	

On squares.

36	on sash
6	sheets.
42	6
3½ doz.	½ doz.

On sash frames, one side

6

Paper p.c., 1/6 per piece, and hanging.

603.0	Ddt.
162.0D	
	94.6
441 0	67.6
÷54	162.0

= 9 pieces

CHAPTER XX.

Example of Billing.

Following up the example of "abstracting," in this chapter is given an example of a bill (the finished product of the surveyor) containing the items previously "abstracted." The same remark as to completeness applies to this as to the example of abstracting. Where headings are given without items under same, these are merely to give the relative positions of the items.

The first bill would be that of the "preliminaries and sundries" containing general particulars of the nature of the work, and also all items that apply generally to the works as "notices and fees," "insurances," "protection," and such like, and also in the case of alterations, to "works on site" requiring reference to the building.

The amount of each trade is entered into a "summary," and this, when cast up, represents the amount of the tender.

BILL No. 1.

EXCAVATOR AND BRICKLAYER.

(*Descriptions of Materials, &c.*)

Yards.	Feet.					£	s.	d.
83	...	...	sup.	Remove top soil 6 in. deep, wheel, fill, and cart away...				
19	...	...	cube	Excavate to surface, trenches, throw out, return, fill in, and ram around foundations				
37	...	...	,,	Do., and wheel and fill and cart away				
23½	...	...	,,	Concrete (*as described*) in trenches				
Rods.								
4	196	...	sup.	Reduced brickwork in mortar				
				Carried forward ...	£			

Feet				£		
			Brought forward ...			
157	...	sup.	Half brick wall in cement ...			
7	...	,,	Rough cutting			
151	...	,,	Damp-proof course (*description*)...			
28	..	run	Labour to beam filling ...			
23	...	,,	Rake out and point in cement to lead flashings			
18	...	,,	Do., to stepped do.			
	No.	3	Ends of timbers cut and pinned			
	,,	4	Extra labour, waste and cement to relieving arches, 1 B × 1 B, and average 5 ft. 10 in. girt			
	,,	3	Window frames bedded and pointed in cement and hair mortar; the sills bedded in white lead			
	,,	26	Fixing blocks (*description*) ...			
			FACINGS.			
865	...	sup.	Extra over ordinary brickwork for red brick facing (*description*)			
13	...	,,	Do. for red brick axed segmental arches (*description*)			
49	...	run	Fair raking cutting and waste in red brick facing.. ...			
5	...	,,	Do. to skew backs			
12	...	,,	Fair circular cutting and waste in red brick facing... ...			
39	...	,,	9 in. × 4½ in. red brick on edge coping, set and pointed in cement, and double tile creasing in cement under, and cement fillet both sides			
	No.	2	Returned ends			
	,,	1	Mitre			
	,,	1	Apex mitre			
	,,	2	Mitres of raking, with horizontal			
	,,	6	Ends of window-sills made good to in facings			
			Carried to Summary ...	£		

BILL No. 2. MASON.

(*Descriptions of Materials, &c.*)

Feet.			BATH STONE.	£	s.	d
20	...	cube	Stone (no labour) and hoisting and fixing			
13	...	sup.	Half sawing			
40	...	,,	Beds and joints (one face measured for two)			
4	...	,,	Sunk beds			
4	...	,,	Circular joint			
5	...	,,	Rebated sunk joint			
2	...	,,	Do. circular			
32	...	,,	Plain face			
3	...	,,	Sunk face			
2	...	,,	Do. stopped			
1	...	,,	Do. circular			
4	...	,,	Moulding			
5	...	,,	Do. stopped			
10	...	run	Plain margin 2 in. wide ...			
4	...	,,	Do. circular			
3	...	,,	Groove			
3	...	,,	Stopped throat			
6	...	,,	Moulding 3 in. girt			
3	...	,,	Do. circular			
	No	16	2 in. lengths of 2 in. plain margin			
	,,	1	Internal mitre to sinking 10 in. wide			
	,,	2	Stoppings to do. 7 in. wide...			
	,,	2	Internal mitres to moulding average 13½ in. girt ...			
	,,	2	2 in. lengths of moulding 3 in. girt stopped one end against splayed face			
	,,	2	Cement and pebble double V-grooved joints average 13½ in. long			
	,,	10	Slate dowels, mortices and cement			
			YORKSHIRE STONE.			
11	...	run	10 in. × 3 in. tooled, sunk, weathered, throated, and grooved window sills ...			
	No.	6	Short fair tooled ends including stools for joints ...			
			Carried to Summary ...	£		

BILL No. 3. TILER.

(*Descriptions of Materials, &c.*)

Sqres.	Feet.				£	s.	d.
4	85	...	sup.	Tiling (*description*)			
	37	...	run.	Extra to tile and half at verge			
	19	...	,,	Pointing to verge			
	23	...	,,	Extra to hip tiles (*description*)			
	22	...	,,	Extra to valley tiles (*description*)...			
	23	...	,,	Ridge tile (*description*) ...			
		No.	1	Fair end			
		,,	1	End cut to face of wall ...			
		,,	1	Do. to slope of roof			
		,,	1	Returned end at hip			
				Carried to Summary ..	£		

BILL No 4. CARPENTER.

(*Descriptions of Materials, &c.*)

	Feet.				£	s.	d.
	10	...	run	Turning piece to 4½ in. segmental soffit			
	15	...	cube	Fir in plates and lintels ...			
	40	...	,,	Fir framed in floors			
	58	...	,,	Do. in roofs			
				DEALS.			
Sqres.							
4	40	...	sup.	in × in. sawn battening for tiling			
4	40	...	,,	in. rough boarding edges shot to roofs			
2	50	...	,,	in. rough sound boarding on in. × in. fillets nailed to joists (joists measured in)...			
	20	...	,,	1 in. gutter boards and bearers			
	44	...	run	Splayed edge to in. roof boarding			
	90	...	,,	Do. cross-grain to do. ...			
	46	...	,,	Double splayed edge to 2 in hips and ridge			
				Carried forward ...	£		

	Feet.				£		
				Brought forward ...			
	83	...	run	Tilting fillet			
	28	...	,,	2 × 2 double herring-bone strutting to 9 in. joists ...			
	28	...	,,	in × in. wrot splayed (*staff-beaded, moulded, or chamfered*) fascia to eaves ...			
		No.	2	Internal mitres			
		,,	1	External do.			
		,,	4	Returned ends			
		,,	1	Short drip in gutter, cross rebated and rounded ...			
				Carried to Summary ...	£		

BILL No. 5. JOINER AND IRONMONGERY.
(*Descriptions of Materials, &c.*)

Sqres.	Feet.			FLOORS.	£	s.	d.
2	50	...	sup.	in. flooring (*description*)...			
				SKIRTINGS IN DEAL.			
	60	...	run	9 × 1 moulded skirtings and grounds and backings plugged to wall			
		No.	6	Internal angles			
		,,	2	External angles			
		,,	4	Housings			
				DOORS IN DEAL.			
	21	...	sup.	2 in. four panel ovolo moulded both sides door			
		No.	1	Preparation in door for mortice lock			
				WINDOWS IN DEAL.			
	5	...	sup.	2 in. ovolo moulded fixed fanlight in three squares (in No. 1).			
				Carried forward	£		

Feet.			Brought forward ...	£		
81	...	sup.	Sashes and frames (*description*) in No. 3			
10	...	run	Splayed, splay-rebated, and throated bottom edge to 2 in. sash			
	No.	6	Extra to moulded horns to 2 in. sashes			
			DOOR AND WINDOW FINISHINGS IN DEAL.			
9	...	sup.	1¼ in. moulded window-board, rebated one edge, and including bearers			
	No.	6	Notched and returned moulded ends...			
53	...	run	Labour groove			
12	...	,,	Do. in oak			
53	...	,,	3½ in. × 1 in. lining, rebated both edges, tongued at angles, and including backings			
21	...	,,	11 in. × 1½ in. cross-tongued, jamb lining, double rebated, double beaded, double grooved, tongued at angles, and including backings ...			
44	...	,,	4½ in. × 1 in. framed, splayed, rebated, and beaded grounds			
57	...	,,	5 in. × 1 in. framed, splayed, grooved, and staff-beaded grounds			
14	...	,,	2½ in. × by 1¼ in. bed-mould, rebated and tongued in, including groove			
	No.	6	Returned, mitred, and moulded ends			
101	...	run	3 in. × 1¼ in. architrave moulding, including mitres ...			
3	...	,,	4½ in. × 3 in. framed mitred, double rebated, and four times beaded transom ...			
			Carried forward	£		

Feet.			Brought forward ...	£		
			STAIRCASES IN DEAL.			
			SUNDRIES IN DEAL.			
			IRONMONGERY, INCLUDING SCREWS.			
	No.	1	Pair 4 in. wrot iron butts ...			
	,,	1	6 in. mortice lock and furniture,			
	,,	3	p.c.			
	,,	6	Sash fastenings (*description*) ...			
	,,	6	Sash lifts (*description*) ...			
12	...	run	Sash handles (*description*) ...			
			1½ in. × ¼ in. galvanised iron tongue and bedding in red lead			
			Carried to Summary ...	£		

BILL No. 6. FOUNDER AND SMITH.
(*Descriptions of Materials, &c.*)

Feet.			CAST-IRON, INCLUDING PATTERNS.	£	s.	d.
24	...	run	in. diameter, rain water pipe, and fixing with to brick facing			
	No.	2	Shoes and fixing			
28	...	run	in. × in. eaves gutter (*description*), screwed to fascia			
	No.	4	Extra to stopped ends ...			
	,,	1	Do. to external angle ...			
	,,	2	Do. to internal angles ...			
	,,	2	Do. to outlets...			
			WROT-IRON.			
			Carried to Summary ...	£		

BILL No. 7. PLUMBER.

(*Descriptions of Materials, &c.*)

Cwts.	qrs.	lbs.			£	s.	d.
				Externally.			
3	1	...		Milled lead and labour in gutters and flashings ...			
	2	14		Do. in stepped flashings ...			
	Feet.						
	40	...	run	Lead wedging			
		No.	57	No. gauge zinc soakers, 8 in. × 6 in., and fixing ...			
		,,	2	Gratings over outlets to eaves gutters (*description*) ...			
				Internally.			
				Carried to Summary ..	£		

BILL No. 8. PLASTERER.

(*Descriptions of Materials, &c.*)

Yards.	Feet.				£	s.	d.
56	...	...	sup.	Render, float, and set walls...			
28	...	...	,,	Lath plaster, float and set ceilings			
18	...	...	,,	Pugging (*description*), joists measured in			
	67	...	run	Plastered moulded cornice, 9 in. girt			
		No.	6	Internal mitres			
		,,	2	External do.			
	20	...	run	*Keene's cement* angle and arris			
				Carried to Summary ...	£		

BILL No. 9. GLAZIER AND PAINTER.

(*Descriptions of Materials, &c.*)

Yards.	Feet.				£	s.	d
	30	...	sup.	21 oz. sheet glass, and glazing in squares not exceeding 2 ft. sup.			
	27	...	,,	Do. do. in squares not exceeding 9 ft. sup.			
28	...	...	,,	Twice distemper to approved tints on plaster ceilings ...			
22	...	...	run	Do. on plaster cornice, 9 in. girt			
				Painting 4 *oils*—			
	24	...	,,	On rain pipe			
	28	...	,,	,, eaves gutter in and out ...			
		No.	2	,, shoes to rain pipe ...			
				Knot, prime, stop, and paint in addition 4 *oils*—			
20	...	...	sup.	On woodwork generally ...			
	60	...	run	,, skirting			
	28	...	,,	,, eaves fascia			
		No.	$3\frac{1}{2}$	Dozens on squares			
		,,	$\frac{1}{2}$	Do. on sash sheets ...			
		,,	6	On sash frames one side ...			
		,,	9	Pieces paper, p.c. 1s. 6d. per piece, and hanging, including preparing walls ...			
				Carried to Summary ...	£		

DESCRIPTION OF WORK.

Date. *Architect's Name, &c.*

SUMMARY.

		£	s.	d.
Bill No. 1.	Excavator and Bricklayer ...			
,, 2.	Mason			
,, 3.	Tiler			
,, 4.	Carpenter			
,, 5.	Joiner and Ironmonger ...			
,, 6.	Founder and Smith			
,, 7.	Plumber			
,, 8.	Plasterer			
,, 9.	Glazier and Painter			
	£			
	Surveyor's charges			
	Lithography			
	Amount carried to Tender ... £			

(*General Notes as to date of delivery of Tender, &c.*)

Having taken the student through the routine of quantity taking, it now rests with him to put the principles into practice; and it is only by careful application in the practice of those principles that he can hope to become proficient in his profession, the extension and adaptation of the principles set forth, to varying circumstances incidental to different works, being entirely a matter of experience.

INDEX.

NOTE.—The terms "Taking off," "Abstracting" and "Billing," refer to examples given of the various processes.

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